ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

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The Brightman Furnace.

We take pleasure in illustrating a new smoke-preventing furnace, the result of many years of study and experiment by Mr. J. W. Brightman, of Cleveland, Ohio, and patented by him in 1885. It is designed primarily for economically burning disintegrated bituminous coal, usually known as "soft slack," and will consume the finest soft coal-dust without waste of fuel, and with economical steam-making results, producing more steam, it is claimed with a ton of "slack" than any ordinary flat-grate furnace will produce with a ton of lump coal. This furnace, which is manufactured in Cleveland, Ohio, by the Brightman Stoker Company, is destined to become very popular, particularly where cleanliness as well as efficiency is desired. In electric lighting stations it will be most desirable. In the Brightman furnace very little smoke is produced, the combustible gases resulting from the decomposition of the fuel being consumed. By the Brightman automatic feeding devices the coal is regularly supplied to the grate, the gases are generated moderately and uniformly, and the fire is kept at an even and sufficient temperature to consume the combustible gases. The admission of air required to support combustion is uniform and exactly adequate.

The mechanical operation of the Brightman furnace will be readily understood by inspection of the accompanying cuts. The coal is first thrown into a hopper, conveniently located for the purpose along the front of the furnace, and thence is automatically fed evenly and in small quantities, to the front part of the grate bars and without exposing any opening through which cold air can enter the combustion chamber over the fire. The grate bars are inclined at an angle of thirty-four degrees from the horizontal, and are made with lateral lugs which overlap each other so that there are no vertical openings between the bars. The entering fuel, being exposed to the heat radiated from the interior walls, undergoes a coking process by which the gases are expelled. As the coal becomes thoroughly ignited, it is moved along by the action of the grate-bars, the combustible gases being entirely consumed.

Each alternate grate-bar is kept in constant motion longitudinally; this motion, combined with gravity, causes the fuel to move regularly towards the rear of the furnace. All fuel on the grate-bars moves simultaneously. This movement is positive and it may be varied as the demand for steam production varies.

This constant and regular movement insures a uniform thickness of incandescent fuel, a sufficient supply of air through the inclined grate-bars, through the supplementary grate at the rear and through the dumping doors, and such an approximation to perfect combustion as cannot be obtained by any system of hand-firing. The draft openings through the grate-bars are horizontal, and consequently fine fuel cannot fall through and be thus wasted.

The hopper is of sufficient size to contain several bushels of coal, and the attention required is confined to keeping the hopper supplied with fuel and to the occasional removal of the ashes from the ash-pit beneath the supplementary grate. Clinkers do not form on the inclined grate bars; all such refuse accumulates on the supplementary grate bars, and is removed once or twice per day according to the nature of the fuel and the rapidity of such accumulation. The heat of the clinkers is absorbed by the air drawn through the supplementary grate and through the dump doors in front thereof; this constant stream of highly heated air mingles with the gases from the fuel on the inclined grate, and by supplying heated oxygen insures the combustion of such gases.

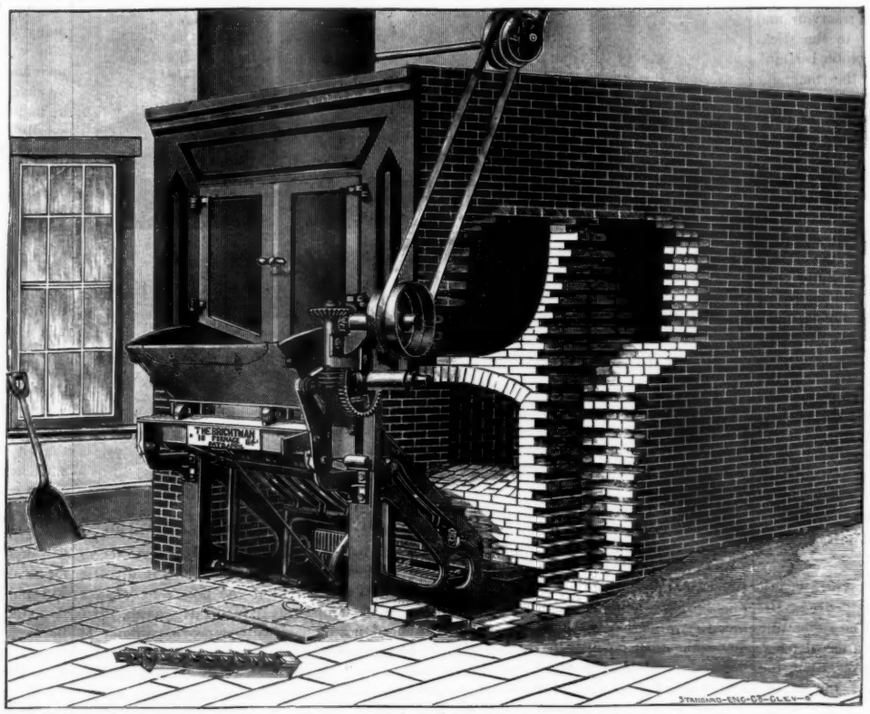

Fig. 1.—View of Brightman Furnace, with Full Cast-Iron Front.—Side Wall Broken to show Internal Construction.

In the outline cut of the furnace (Fig. 8) the letters are explained as follows:

A, fire-brick arch over smoke passage in bridge wall. *B*, smoke passage through bridge wall. This passage is equal in width to that of the grate, two feet high in front and eighteen inches high in rear, the floor of the passage sloping upwards towards the rear. *C*, bridge wall cutting off all communication between the combustion chamber and space in rear of bridge wall, except through the smoke passage *B*. *D*, door for access to interior of furnace. *E*, boiler supported as usual. *F*, grate-bars, each alternate bar has a horizontal reciprocating motion variable within limits of one fourth inch to one inch. Lugs cast on either side of contiguous grate-bars overlap each other, the air openings between these lugs being horizontal. *G*, dumping door for removal of clinkers, etc., from the supplementary grate. This supplementary grate is cleaned once or twice per day according to the quantity of coal consumed. *H*, rod for opening and closing the dumping door. *I*, hopper, to be kept filled with coal. The arrow shows the passage of coal from the hopper to the grate-bars. The coal is pushed through this passage by the reciprocating slide shown at the bottom of the hopper. *J*, breeching, for conveying products of combustion to chimney. *L*, floor line.

To Set Type by Electricity.

A novel machine, which is intended not only to set type automatically, but to correct all errors before the type is set, has been invented by a stenographer of this city, and patents have been issued to cover all its vital principles. The machines hitherto made to set type have all had a keyboard, before which the operator sat, and by touching the keys caused the type to drop as wanted from reservoirs through guiding tubes into the stick or galley made to hold them, thus setting the matter in one continuous line, which an assistant broke up into short lines to fit the newspaper column or book page, as desired. In the stenographer's machine the operator prepares a tape which is run through a machine which sets the type automatically. In preparing the tape the operator sits at a keyboard, which can be arranged like the keyboard of either of the common typewriters. When a key representing a letter is touched the act punches three holes in a line across the tape. The three holes are always in a line with each other, but they are in different places on the line, according to the letter to be represented. Thus the letter a could be represented by three holes like these:

o o o

and the letter b by these:

o o o

Every time a letter is punched the tape is moved along a certain distance before another letter is punched. This distance depends on the width of the letter. Thus, if the tape is moved one-fourth of an inch when the letter e is punched out, it would be moved along one-half inch when the letter m is punched out, because the letter m is twice as wide as the letter e. Spaces between words and all sorts of type characters are allowed for in this way. As the tape runs out of the machine an assistant measures it off with a rule which is divided up in sections which represent every type character. The whole length of the rule represents the length of a line of type to fit the page or column desired. When the end of the rule lands near the end of a word so that by thin-spacing the remaining letters would go into the line, enough holes representing the ordinary thick spaces between words are filled and replaced by other holes representing thin spaces, which are punched in by hand in order to allow the letters to come in. If a word is to be divided, a line of holes representing the hyphen is punched in between the two syllables, and then holes representing spaces are changed until the rule shows that the line is exactly spaced out. As the spacing is done mathematically the lines must be all of the same length, and thus the pressman will never be obliged to insert a "Dutchman" to make a "form lift."

The tape is read by copy for errors. The lines of holes which represent wrong letters are filled, the correct holes are punched, and the holes representing spaces are changed until the line is exactly full. Where words are left out the tape is cut apart and lengthened and the holes punched in. Doubled words are corrected by filling half the holes.

At the end of each line a row of holes representing a quad to separate the lines for convenience in handling is inserted. Then the tape is run through a machine which makes another tape with duplicate lines of holes the lines being at a uniform distance from each other. This tape is used to set the type.

Each type character has a reservoir, and the reservoirs are placed side by side. A series of pointers are arranged to simultaneously fly at the bottom type in each reservoir, but a series of ten narrow, thin steel plates intervene between the points and the type. These plate have rows of little holds in them, and under certain circumstances the holes get into such a position that one of the pointers passes through the plates and knocks a type out of its reservoir. The type slides down a shoot and lands in the "stick" that is ready to receive it. The tape, by mean of an electric current, controls the little steel plates. When the tape is put into the type-setting machine it passes over a steel roller and under a row of ten steel fingers. The roller is connected with a battery. As the tape passes over the roller the fingers find the rows of holes and drop into them. Each finger is connected with a magnet, and each magnet with one of the ten narrow steel plates that keep the pointers from reaching the type in the reservoirs. When a row of holes in the tape representing a character passes under the fingers, the fingers above the holes drop down on the cylinder, a current of electricity passes to the magnets, and the magnets, thus influenced, draw such a combination of the little plates from one side of their normal resting place to the other as will allow the pointer opposite the required letter to reach the type in the reservoir and force it into the shoot leading to the stick. The impulse given to the pointer is simultaneous with the action of the magnets. When the tape passes on, the plates and pointers return, until another row of holes in the tape is reached, and then the action is repeated. As the matter to be set is corrected and spaced in the tape, the type, as set, need only to be lifted into the column or page. The speed of the machine is limited only by the rate at which the type can drop into place. Corrections can be made in a tape by a skilled operator more rapidly than they could be made in type by a compositor, and the operation of punching the tape can of course be done more rapidly than type can be set.

Mr. J. E. Munson, the inventor of the machine, has also devised a machine through which the tape can be run, and by an electric current, can reproduce itself at the other end of the wire. In this way a newspaper could be produced, simultaneously in any number of towns.—*New York Sun.*

An Interesting April Fooling.

Editors Electrical Review:

In the evening of the first of April, last, a social party convened at the residence of Dr. G. P. Hachenberg, well known as a scientific electrician and inventor of musical telegraphy. In course of the conversation the magnet became the subject. One of the party exhibited an instrument of fine workmanship and great sensitiveness which was handed to the doctor for examination. The doctor took it, looked it all over, placing it into all kinds of positions, and then surprised the owner of it by telling him that the magnet was not true to the North.

"What is the matter with it," anxiously exclaimed the owner of the instrument, who by the way had been recently married to a beautiful lady, who was likewise one of the party.

"Why," says the doctor with great gravity, "you have carried the instrument so long that its borial attraction has been metamorphosed into a personal magnetism, not for your own person, but on the one to whom you had great concentration of mind."

All eyes were turned towards the young wife; who chided the doctor, with a blush, that it was rather cruel for him perpetrate a joke at her expense.

"Well," remarked the doctor to her, "you may take it as a joke, but allow me to demonstrate my assertion."

So he ordered the party to take seats around the table with him, placing the lady in question on the east side of the table. The instrument was placed on the table, and the needle at once whirled around like crazy; but finally stopped, however, pointing not to the North but towards the lady. It was then proposed for her to take different places, at the table and in the room, but the point of the needle continued pointing towards her wherever she went.

After this the doctor remarked that if she took her position behind her husband the personal magnetism would be broken, and the magnet would again go mad for want of a concentrating influence. The lady took a position behind the gentleman, and sure enough the needle whirled around at first slowly, but finally with such rapidity as to be almost invisible. As it may be expected the whole company became intensely excited over the affair. Finally the doctor took up instrument and did some manipulation to it, with a sort of ludicrous gravity.

"Ah! I have got it," he remarked.

"What?" cried a half a dozen voices almost at once.

"I have broken the magnetism, and made it subservient to my will."

The doctor placed the magnet again on the table, and then delivered a s ries of orders to it. To the great astonishment these in proper rotation were promptly complied with. He had it to point out different individuals; but what was singular, whenever it was to designate the owner of the instrument, the needle would always turn around twice before doing so; for the lady it would point with great sensitiveness, that is with a tremor; to any of the rest the action was direct. In this wonderful exhibition the doctor usually, but not at all times, held the index finger an inch or two from the point of the needle as if to aid it on its course. By this method he placed the needle into all kinds of positions to the great wonder and amusement of all.

Will you please explain by what means these experiments were performed. There was no ocular delusion about it, and nothing remarkable about the table, except its extreme lightness, made out of very thin white pine boards. The owner of the magnet told me afterwards that he found nothing wrong about the instrument. In parting with the doctor that evening he archly asked his visitors what day of the month it was—this aroused at once my suspicion that we had been the fools of a scientific joke. W. P.

Austin, Texas.

[Our heading to the above communication is a sufficient answer to the writer's inquiry. In all probability when the doctor addressed the magnet, as if it was an intelligent being, and at the same time made it appear that he was aiding its action by the end of his fingers, it was only to divert the attention of his visitors from noticing what his other hand under the table was doing, in which evidently he held a heavy pocket knife, such as a Texan is likely to carry, or some piece of iron, by which he caused these strange movements of the needle of the magnet. No doubt the trick was well carried out.]

—— The Coatesville Electric Light Company, Coatesville, Pa., has been organized. Capital stock, $10,000. The treasurer is Charles L. Huston, Coatesville.

A Few Words About Kerite.

Editors Electrical Review:

In your issue of 16th inst. your genial Western correspondent calls the attention of your readers to successful electric lighting under very adverse circumstances. For instance, he speaks of supplying light "to mills on opposite sides of the river, one of these being supplied through an armored cable, laid in the bed. This is a new departure, and is reported as a perfect success." In another part of his letter he speaks of mine lighting, and again of service in the great packing houses at the Chicago Stock Yards. This last he seems to think is about the worst place to run electric light wires, and he enumerates at some length the difficulties of the situation, as to wet, slipperyness, fog, extremes of temperature, etc., but winds up with the remark that with all these "impediments to insulation, the lights are giving the best of satisfaction" etc., etc.

Now, if he had only enlightened your readers as to the medium by which all these good things had been accomplished, he would have rounded out his letter to the satisfaction of all concerned, and not have made it necessary for me to say that, in every case he specifies as producing good results under adverse circumstances, kerite is used as an insulator.

He is hardly correct in calling the armored submarine wire a new departure, as there are a number of them in use in this country and Canada that are working perfectly, and have been in constant use for several years, all of which I have furnished. His letter brings to mind what I have so often said to managers of companies using electric currents, "In situations fatal to all other insulations, kerite will prove durable and economical."

Yours truly,

CLARK B. HOTCHKISS,
Gen. Agt.

120 B'way, New York, Jan. 18, 1886.

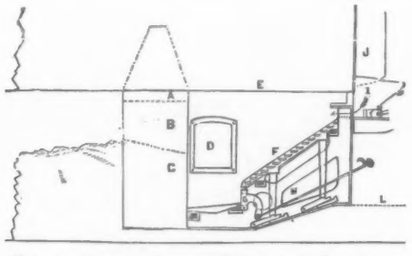

FIG. 3.—OUTLINE CUT OF BRIGHTMAN FURNACE.

Mr. Lamar's Telephone Argument.

Mr. Lamar's argument in the matter of the Bell telephone has a fatal flaw in it. He says that "surely if the power to vacate a patent wrongfully issued exists at all, there need not be a statute to provide a mode of its exercise, when a mode exists without a statute." Now it is a truism that neither the Federal Government, nor any officer thereof, has the power to do any act whatever unless the same be prescribed by the Constitution or by statutes enacted in accordance with it. Undoubtedly, the legislative branch of the Government has power to provide by statute a way whereby patents may be vacated, but no member of the executive branch has power to move in the matter, except by a way which has been so provided. If no statute exists, pointing out a way to do it, a patent cannot be vacated. Congress must first pass a statute. As Mr. Lamar rightly asserts, such statutes were enacted in 1790 and 1793. But he also asserts that these were so modified by the legislation of 1866 as to "deprive the courts of the power to vacate patents as an incident to private suits." He then argues that the right to cancel patents, taken from the courts by this legislation, reverted to the Government. Not so. What reverted to the Government, if anything can be said to have reverted, was the power to enact new statutes in place of the former ones which had been repealed. Until the legislative branch of the Government does this, no patent can legally be canceled. A patent can no more be vacated without a statute than it can be issued without one. If at present no laws can be found in the statute books, as the Secretary declares, whereby patents may lawfully be vacated, let Congress see to it that such legislation be had and let the executive branch of the Government await such legislation before presuming to take action.

Great Barrington, Jan. 16. J. M. M.

* * A telephone line has been erected in Maine from Portland to Fryeburg, and will be extended to the White Mountains.

* * The *Organe des Mines* states that the paper rails now being made at St. Petersburg have proved to be extremely durable, while they cost one-third less than those made of steel.

* * An old lady read a paragraph in one of the papers the other day, describing how a grindstone burst in a saw mill and killed four men. She happened to remember that there was a small grindstone down in her cellar, leaning against the wall; so she went out and got an accident insurance policy, and then, summoning her servant, and holding a pie-board in front of her face, so that if the thing exploded her face would not be injured, had the stone taken out into the road, where twenty-four pails of water were thrown over it, and a stick was stuck in the hole bearing a placard marked "Dangerous." She says it is a mercy the whole house was not blown to pieces by the thing before this.

* * Scientific men have been perplexed for many years over the phenomenon of a certain well at Yakutsk, Siberia. A Russian merchant in 1828 began to dig the well; but he gave up the task three years later, when he had dug down thirty feet and was still in solidly frozen soil. Then the Russian Academy of Sciences dug away at the well for months, but stopped when it had reached a depth of 382 feet, when the ground was still frozen as hard as a rock. In 1844 the academy had the temperature of the excavation carefully taken at various depths, and from these data it was estimated that the ground was frozen to a depth of 612 feet. Although the pole of the greatest cold is in this province of Yakutsk, not even the terrible severity of the Siberian winters could freeze the ground to a depth of 600 feet. Geologists have decided that the frozen valley of the lower Lena is a formation of the glacial period. They believe, in short, that it froze solidly then, and has never since had a chance to thaw out.

* * The Simplon tunnel, which will very shortly be commenced, is the most formidable of the gigantic railway connections undertaken of late years to facilitate the communications between Italy and the rest of Europe; and the project suggests a comparative note on the existing Alpine tunnels. At the present time the Alps are pierced by three remarkably long tunnels, entering Italy from France, Switzerland, and the Austrian Tyrol, respectively, and called according to the mountain chains that are traversed, the Mont Cenis, St. Gothard, and Arlberg tunnels. Of these Mont Cenis is seven miles and three-quarters in length. Its cost was $15,000,000. The St. Gothard tunnel is nine miles and a quarter in length, and cost $12,500,000, the diminution in expense being owing principally to the more rapid progress of the work by improvements in the drilling machines. The Arlberg tunnel is shorter than either Mont Cenis or St. Gothard, being only six miles and a half. The last and most formidable rival will be the Simplon tunnel, by which the existing line from Geneva to Martigni and Brieg will be carried through the mountains to Dumo d' Ossola, and so on to Pailanza or Stresa on the Lago Maggiore. As this tunnel will be commenced at a much lower level than any of the others, it will necessarily be large, the rough estimate being twelve miles and a half, and the estimated cost somewhere about $20,000,000.

Spontaneous Combustion of Coal.

ED. MECHANICS: On page 350, December issue of *Mechanics*, there is a reference to spontaneous ignition of bituminous coal "*quite free from pyrites.*" It would interest me to learn more of this matter, for I have given this question must attention, investigating a large number of fires from the spontaneous ignition of bituminous coal, and from the analysis made in each instance, as well as numerous published analyses of bituminous coals, considered that all bituminous coals contained iron pyrites. Should be happy to read something on this subject in future numbers of *Mechanics*.

Boston. C. J. H. WOODBURY.

[To the matter of spontaneous combustion no one of whom we know has paid more attention than Dr. W. H. Wahl, secretary of the Franklin Institute. So we referred to him Mr. Woodbury's letter, and have the pleasure of publishing herewith his comments thereon:

ED. MECHANICS: Referring to our correspondent's (C. J. H. W.) doubt respecting the brief note in December *Mechanics*, on the spontaneous ignition of bituminous coals free from pyrites, I beg to say that we have the best authority that the statement of *Mechanics* is correct.

For ample evidence on the subject, I would refer your correspondent to Richter's investigations, quoted in Percy's Metallurgy (Ed. of 1875), and commented on in *Polytechnic Review*, Vol. II. (1876), p. 101, and to the *Engineering and Mining Journal*, Vol. XX., 329 *et seq.*

On one point your correspondent is probably correct, *i.e.*, in the assertion that all bituminous coals contain iron pyrites; but it has been amply demonstrated that some of the most pronounced self-inflaming coals are those which contain so little sulphur that its presence could be safely ignored, even in a chemical analysis; and further, that while the presence of pyrites may, and doubtless does, contribute to the tendency of bituminous coals to spontaneous ignition, those varieties which contain the largest percentage of this impurity are not those which are most liable to spontaneous ignition, and that this phenomenon is due principally, if not exclusively, to the oxydation of the organic substance of the coal.

W. H. W.

Philadelphia, December 21.—*Mechanics.*

Electric Lights for Carriages.

The success of the incandescent electric lamp for private carriages in Paris, as a substitute for candles and oil lamps, is pronounced very satisfactory. Not only the regular side-lights are included in this plan, but the interior of the vehicle is illuminated by a lamp sufficiently powerful to read by, and in some instances a similar lamp is placed, for a novelty, on the head of the horse. The lamps are connected by wires, with small accumulators, placed under the driver's seat; they are small in size, being only about eight inches square and four inches high, each of such accumulators being able to supply a lamp of five-candle power, for the space of some six hours. During the day they are removed and charged with electricity from a dynamo machine, and at night they are ready for use.

*** The telephone is being rapidly introduced on German railway lines at places where the old electro-magnetic signaling appliances can be superseded with advantage.

Increasing the Attraction of Washington.

A Washington correspondent says: "The question of electric illumination for out-door purposes is receiving a great deal of attention in other cities, and has begun to assume prominence since the session of Congress. Several members of the house have spoken in my presence of the absence of electric lights here, as compared with other cities, and their comments were to the marked disadvantage of Washington. The only reply to this was that they were themselves to blame for the present situation, because, if Congress would make an appropriation large enough to have the experiment conducted properly, there is no doubt that Washington would soon be provided with a complete system of electric lights. Several of the members to whom I spoke expressed themselves as decidedly in favor of illuminating the corridors of the large Government buildings, the principal streets and parks with electricity. * * * The subject of lighting the parks and open places which abound in this city is one of importance. The present condition of the parks is such as to arouse the predatory instincts of the highwayman, and it is not an infrequent occurrence to hear of footpads making successful assaults and escaping into the darkness with their booty. If the Smithsonian grounds, Franklin square, and other similar places were thoroughly lighted by electricity, it would do much to check this rapidly-increasing evil. Not only is it a question of utility, but it is also a question of increasing the attractions of the city. Those who recollect the appearance of the grounds around the Executive Mansion last spring will remember the brilliant spectacle which they presented at night under the electric lights. It was a good example of what may be done in the way of electric lighting, and a vast improvement over the sickly glare which now surrounds the White House after sundown. Electricity is also cheaper than gas for the purposes of out-door illumination. An electric light of 1,000 candle-power can be produced at a less expense than the sixty Washington gas-lights which it would take to equal it in intensity. The illumination of the city by electricity will come sooner or later, and the sooner it comes the better it will be for Washington."

.... The Lake Shore telegraph operators will hold their annual ball in Buffalo, February 18th.

* * The electric tramway on the promenade at Blackpool, England, is now in full working order, and cars driven by electricity run daily. A statement of the cost of laying the line by the corporation has been issued. The line is 2 miles 1,000 yards in length, and the actual sum expended was $55,000. The cost of laying the central channel for the electrical apparatus was borne by the company which works the line.

* * The certificate of incorporation of the Continental Conduit Company, of this city, has been filed. The company is to "manufacture conduits for telegraph, telephone, electric light and other electric conductors, separately or in combination with sewer, water, gas, steam, and other service." Its capital stock is $2,000,000, and its incorporators and trustees are John D. Beers, J. Pierson Grant, Eugene W. Austin, Charles D. Judd and Edward B. Thomas.

* * At the annual meeting of the Montreal Telegraph Company, Mr. Andrew Allan was re-elected president, and the following board of directors elected: Messrs. Andrew Allan, John Crawford, Hector Mackenzie, John Stirling and Wm. Cassils.

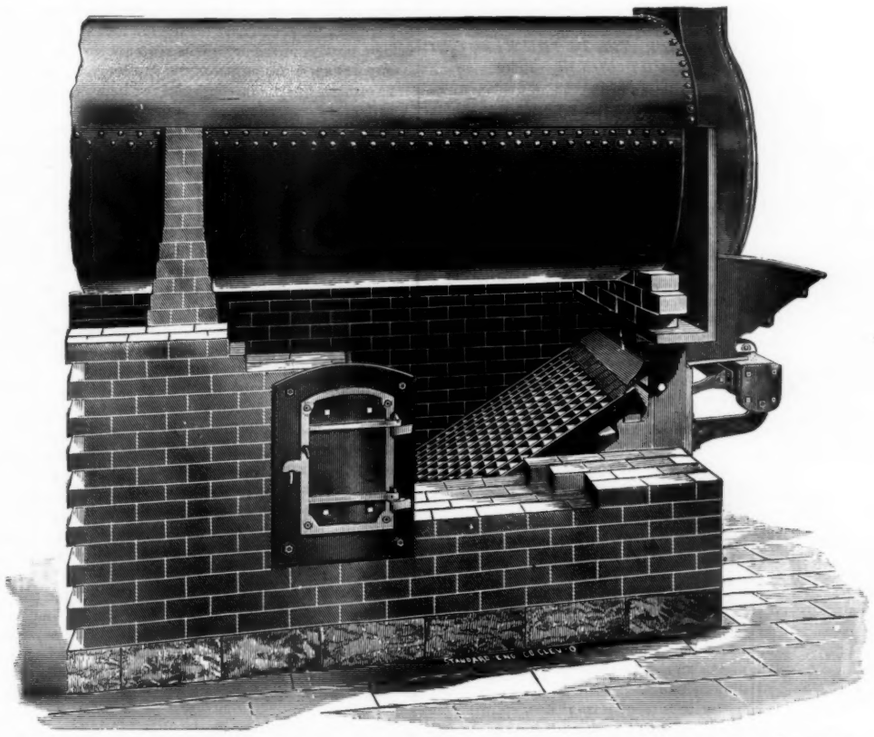

FIG. 2.—SIDE VIEW OF BRIGHTMAN FURNACE APPLIED TO HORIZONTAL CYLINDRICAL BOILER, WITH ORDINARY SHEET OR CAST IRON SMOKE-BOX ATTACHED TO BOILER HEAD.

* * In 1883 the Academy of Mining and Forestry in Chemnitz, Hungary, was furnished with incandescent lamps, the electric current being supplied by about ninety accumulators. A paper by S. Schenck and S. Farbaky describes the construction of the accumulators employed, and gives an account of some observations made by the authors. To study the behavior of the sulphuric acid during the condensation of the discharge of the current, a series of experiments was made. It was found that when the accumulators are charged, the sulphates are decomposed, sulphuric acid being liberated; whilst on discharging, the sulphates are again formed, the free acid being re-combined. To determine the ratio of accumulated energy to acid set free, and the ratio of discharged energy to acid fixed, a further series of trials had to be made. The results appear to show that when the accumulators are charged, 2.23 grams of sulphuric acid are liberated per ampere per hour, and that during their discharge, 2.25 grams of acid are fixed, giving a mean value of 2 24 The authors term this number the electro-chemical equivalent of sulphuric acid for an electric force of one ampere per hour. From this value some useful data in regard to the preparation, treatment and application of electric accumulators are said to be derived.

—— The Edison Electric Company has ordered an increase of its capital stock from $1,000,000 to $2,500,000.

—— Electric light is being used on the Florida Southern for laying tracks by night. This is done to avoid delay of trains, which would occur if it was done by day.

—— The electric lighting of the Colossus consists of 411 lamps, every part of the ship being illuminated. There are three dynamo machines, any one sufficient for all the purposes required.

—— The Kansas City Electric Light Company has elected the following directors: Messrs. William Holmes, J. S. Chick, W. B. Grimes, J. W. Phillips, H. C. Sprague, F. K. Hoover, J. H. North, C. E. Barnhart and E. R. Weeks. This company operates the Thomson-Houston system.

—— Burlington, Iowa, is to have her streets lighted by electricity. It is proposed to have street-intersection electric lights at certain points in the heart of the city and in the suburbs, and reduce the number of gas lamps to 200, making the aggregate cost to the city for street lighting $8,000.

—— The citizens of Youngstown, Ohio, are to be made happy by the electric light, 180 arc lamps of the Thomson-Houston system having been contracted for. These will be placed on the streets of the city as soon as the order can be filled by the Thomson-Houston factory at Lynn, Mass., which is now at work upon it.

—— A company has been formed, known as the Sea Cliff Elevated Railroad Company, who are to build and operate an elevated railroad from the Sea Cliff Station to the "Cliff," a distance of two and a half miles. They also intend that the engine used in operating the railroad, which will be a cable road, shall furnish the village with electric lights.

—— Articles of incorporation of the Colorado Springs (Colorado) Electric and Illuminating Company have been filed at the county clerk's office. The incorporators are: Orlando Metcalf, Irving Howbert and W. P. Beach, and the capital stock of the company is placed at $50,000. The first year the directors of the company will be: O. Metcalf, Irving Howbert, W. P. Beach and J. J. Hagerman, of Colorado Springs, and H. T. Rogers, of Denver.

—— The managers of the Pottsville (Pa.) Gas Light Company have purchased a controlling interest in the local corporation formerly known as the Anthracite Electric Light Company, and there will be no further conflict. The electric company's franchise had an exceptional value in that it granted the promoters an exclusive right to supply electric light for a term of years.

—— Mr. C. Hinckley, superintendent of machinery of the Union Pacific Railway, believes the introduction of electric light for locomotive head-lights is only a question of time. He says: "The experiments that have so far been made have resulted rather successfully, but improvements are being made. The electric light for head-lights was tried on some Eastern roads, but the jar of the locomotive caused the interruption of the current of electricity. Experiments, I believe, are now being made to remedy this defect, and I believe that we will see the electric light used for this purpose very shortly. It is not so, as has been reported, that the engineers find such lights a strain on their eyes, but, on the contrary, they like them much better than those in use, and they light the track for a much greater distance ahead."

Electrical Review.

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EDITORIAL ANNOUNCEMENT.

Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania.

Frank M. Gilley. 54 Equitable Building, Boston, Mass., is our New England representative.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill, will represent the REVIEW in the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, JANUARY 30, 1886.

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Attorney-General Garland will have nothing to do with the telephone case, but still holds his telephone stock.

If the Government intends to assume the telegraph business of the country, why not include the telephone business and the railroad business?

After six years in its service, Mr. C. P. Whitney has resigned the secretaryship of the Brush-Swan Electric Light Company, to take effect on the 1st prox., being generously granted a four-months' furlough for recuperation, without change of address until further notice. He will be succeeded by Major G. McFall, of the Brush Electric Illuminating Company, of this city. Mr. Whitney still retains the agency of the Detroit Iron Tower Company for the eastern United States, and also the same and that of the Brush Electric Company for Spanish America, where he has made a large number of installations for the lighting of cities, mines, etc., and he is also largely engaged in other interests in Central America.

The New York Subway Commission should make its report. The ablest electricians have been consulted, plans have been examined, and, in a few instances, systems in practical operation have been visited. If the commission make a report promptly, and if it is one that can be indorsed by the electrical companies interested, then the work of placing the wires underground in this city will progress rapidly and intelligently. Commissioner Loew is reported as saying that in a very short time the commission will have a "conduit ready for the reception of the wires. The plan that we propose to adopt will, so far as possible, be efficient in every particular, and its cost will not be so great as to ruin the companies that will have to pay for constructing it. I think that it will be the most complete system used in this country." This is sensible talk, and we trust the commission will lose no time in making its report, regardless of the wailings of that never-satisfied paper, the New York *Times*, which has been so long engaged in crying to have the wires put underground, and is just now apparently changing front because it fears the commission is not going to put the wires underground in accordance with its plan. There has been much good business sense exercised by this Subway Commission, and the REVIEW hopes to see it continue.

REDUCED RATES TO THE ELECTRIC LIGHT CONVENTION.

The Chairman of the Committee on Transportation, Mr. Geo. H. Wadsworth, requests us to announce that all delegates to the National Electric Light Association to be held at Baltimore, February 10th will be furnished with excursion rates by the Pennsylvania Railway Company by calling upon the agents of that company named below:

J. M. Chesbrough, Asst. G. P. A., Vandalia Line, St. Louis.

C. W. Adams, Asst. G. P. A., Pennsylvania Lines, 65 Clarke street, Chicago.

Frank Vandusen, G. P. A., Pennsylvania Lines, 4th and Vine streets, Cincinnati, O.

H. R. Dering, G. P. A. Pennsylvania Lines, Indianapolis, Ind.

A. Anderson, District P. A., Louisville, Ky.

Thos. A. Watt, P. A., Pennsylvania Road, Pittsburgh, Pa.

C. L. Kimball, Asst. G. P. A., Pennsylvania Co., Cleveland, O.

Parties wanting special cars will be able to get reduced rates from any of these gentlemen.

THE INSURANCE OF CENTRAL LIGHTING STATIONS.

In its early days the relation of electric lighting to insurance was practically confined to considerations involving the relation which the possible dangers of electricity bore to the known dangers of other methods of illumination.

The results of experience, showing the safety of electric illumination, have fully justified the proposition laid down several years ago, in the face of some opposition, by one of the specialists employed by the insurance companies, that a well arranged electric lighting plant was the safest method of illumination.

As to the numerous details of this matter the two parties in interest have long ago reached a definite basis of understanding.

With the growth of that particularly American form of application of electricity, known as the central-station system, there has arisen the nucleus of a new relation between electric-lighting and insurance companies, and that is in the relation of insurer to underwriter.

Of the large amounts of capital invested in electric illuminating companies, there is at least $15,000,000 in the combustible valuation of central-lighting stations, omitting other valuable property in circuits, lamps, and foundations.

As electricity in illumination is used from hand to mouth, the supply must always be equal to the maximum demand, and every precaution has been taken to ensure continuity of the operation of such lighting stations, in the face of every possible contingency.

The buildings are of brick, built low, and for this especial purpose; the motive power and connecting mechanism arranged in the best manner, and often partially in duplicate, for security.

The paramount feature of such lighting stations is the thoroughness with which every expedient has been utilized, which will tend to preserve the operation of the plant.

Moreover, the property is not left to its own chance outside of working hours, but the attendance, particularly at night, consists of a number of skilled, reliable artisans.

Could anything be added to make such property less liable to fire loss?

How different would be the case if the lighting plant were housed among other tenants in large buildings, where room and power could be hired, and attended during working hours by the average workman, waiting for bell-time.

The executive officers of such companies as faithful trustees of the interests left to their charge, protect the property by insurance to an extent which will relieve them from imputations of negligence in case of fire.

Now, what does the payment of the premium upon an insurance policy mean? It means that the insurance company distributes the losses of the unfortunate few upon the fortunate many. The clients' money is paid to the insurance company as to a trustee, the funds paid for the fire losses being a portion of the premiums, and not an assessment upon the capital of the company.

An insurance premium consists of two items. About 60 per cent. of the premium covers the chance of destruction by fire, and the equity of the whole matter depends upon the skill with which this element of chance is estimated by those guided by long experience in such matters. From the time the client pays for his policy and the agent pockets his commission the premium is subjected to a continuous succession of shrinkages—blotters, calendars, erasers and rulers, commissions, salaries, advertising and traveling expenses reach up to 35 per cent. That is, the insurance corporation takes 35 per cent. of the premium, and the stockholder gets 5 per cent. for distributing the fire loss of 60 per cent. The paid-up capital serves to preserve the commercial equilibrium of the company; and, when administered in wisdom and probity, insurance is as legitimate exercise of capital as banking or transportation.

In matters pertaining to all expedients to insure the safety of electric lighting, the great electric interests have always met the great insurance interests in the spirit of co-operation and candor, but have they been met in the same manner in the insurance of the vast interest represented by their insurable property.

Have the premiums been based upon a legitimate advance upon the actual hazard by fire, or has advantage been taken of various enforced conditions as a means of increasing rates for the purpose of adding to profits or recouping losses made by bad business elsewhere. The rates upon such property range between one and three per cent.; and from a recollection of the various fires communicated to electric light stations from outside sources, and starting in the stations, principally from hot bearings, one cannot escape the conviction but that the rate is largely in excess of the hazard upon such property.

The cotton mills in New England were charged excessive rates some 40 years ago, and in consequence of such action they formed their co-operative system of mutual insurance which has now increased, until it affords protection to the extent of nearly four hundred million dollars ($400,000,000) upon the best industrial property in the eastern portion of the United States. Outgrowing their early limitations of cotton mills, they now also insure woolen and worsted mills, print works, and bleacheries, paper mills, and metal-working establishments.

By writing only upon selected risks of good construction free from outside hazards, and insisting upon good order and efficient fire protection, they have reduced the annual cost of insuring a cotton mill from 2½ per cent. in 1835 to less than ¼ of one per cent. in 1885. The methods of administration and results of the work are frequently published and the system is no experiment, but claims its success solely upon the fact that it embodies the simplest and most equitable method of distributing the losses of the few upon the many.

The question naturally arises in the mind of a conservative person, how can the insurance in these mill mutual insurance companies be so much cheaper than insurance in the stock companies, which it is well known do not make much money?

The economy of administration resulting from writing policies in large amounts all at the home office, neither advertising nor paying commission, the expenses are reduced to about 6 per cent. of the premiums.

By writing only on isolated risks of good construction, the building is free from external hazards and of a better class of property. By arranging that the property be provided with a complete system of fire protective apparatus sufficient to cope with fires, and limiting the losses to small amounts, save in exceptional instances.

The results for an experience of some fifty years show that these conditions have been ample to secure the known results. It is inevitable that most buildings cannot be made to meet these conditions, and that the great bulk of property must be insured in stock insurance companies, because it cannot be brought within the necessary limits of mutual insurance companies.

The preliminary work of modifying defective construction, and equipping the property with abundant safeguards against fire, which was such an important element in the formation of these mill mutual insurance companies, will not be necessary in the case of the majority of modern electric-lighting stations, which already possess every available feature of construction and equipment, tending to reduce the fire loss.

In the interest of none but the electric-lighting companies, we ask, Is not this vast interest prepared for such a system of co-operative insurance?

GENERAL WESTERN NEWS.

A case of conflagration in Paris, France, should carry with it a warning. An incandescent plant was wired, as is the custom everywhere, beneath wooden mouldings A workman on the premises, desirous of fastening some article on the wall, without knowing better, of course, drove a staple through the moulding and short circuited the branch. The current was turned on afterward, when the party who had innocently done the mischief had finished his part of the work, and the result was a blaze. If the wires had been properly protected by soft metal strips, as should be always required, the accident could have had no greater proportions than the fusing of one of these

There is a story floating round the press, without reliable parentage—a sort of marvelous orphan, a nondescript relation bereft of relatives—to the effect that a current of electricity got away somehow, and went directly through a slab of marble an inch thick, completely pulverizing the stone in its passage and burning the electrical conductors on the other side; and to this statement is added the reporter's codicil: "Let electricity once get beyond control, and it would appear that there is hardly anything it is not capable of achieving in the way of destruction."

These are new year's gifts from the world at large to the electrical fraternity, presented with the compliments of the season, and "a-wishin' e'm better luck in future."

Every newspaper man knows the occasional difficulty of gathering news for a daily paper, and the feverish desire on the part of the public for something sensational on which to feed its morbid appetite. A case in point occurred here a few days since, which will illustrate the principle. A Chicago correspondent, apparently short of matter with which to fill his column in a New York daily, fell back on an old rumor, which was born, flourished feebly for a day or two, lingered

in a sickly condition a short time, died, was buried and forgotten. This, revamped, was telegraphed eastward and published. On the principle of "You tickle me, Tommy, and I'll tickle you," the New York correspondent of a Chicago paper saw an opportunity to refute the statement, and the dear public here were next day treated to a complete contradiction of the whole story—and the two correspondents were then ready for another, similar opportunity to make a stake on very small cards. The matter would have received no notice here were it not that it bore quite directly on electrical matters, and the statements on which the whole fabrication was erected were all "What-you-may-call-'ems." As these are not advertising columns, no names are mentioned.

The Gray National Telephone Company at Chicago was licensed by the Secretary of State on the 16th instant. Capital stock, $2,000,000. The company is to manufacture and deal in all sorts of electrical apparatus applicable to telephone and telegraphic enterprises, and will construct, equip and operate lines and exchanges. Elisha Gray, Nelson E. Swartout and Noble B. Judah are the incorporators.

By way of keeping up with the procession, Aurora, Ill., has organized a telephone company, to be called after the town. Capital stock, $10,000. Incorporators, Willis Hoyt, W. S Beaupre, A. C. Miller, F. L. Bartlett and Fred. O. White.

At the County Commissioners' regular meeting, on the 18th instant, the special committee on electric light submitted a report recommending the acceptance of the plants placed by the United States Electric Light Company, and the appointment of employes to take charge of and run the plants. Some discussion ensued, Commissioner Wren claiming that the lights were not fully up to the mark, while Commissioner McCarthy, taking the defensive, said the company had more than filled its contract, and he thought the report of the committee should be adopted. The report was adopted.

The Michigan Overland Telephone Company, which up to date has been awaiting developments, held its regular annual meeting on the 19th at Detroit, its headquarters. The stockholders are all in high glee over the Secretary's action. The company claim to have between 400 and 500 wires run to their exchange, and nearly 600 subscribers in that city. Many of the subscribers are "provided with instruments ready for use, which would have been put in service long ago if it had not been for the Bell Company."

By what sort of reasoning outside corporations can convince themselves that the restriction which for years has kept them out of the field is suddenly removed by the action of the Secretary of the Interior, is one of those mysteries which are beyond the ken of ordinary wisdom. One thing may be set down for a solid fact—somebody is going to be grievously disappointed after a while.

The St. Louis Pan-Electric Company, according to a correspondent, put their telephonic system into operation on the 19th, and gave an exhibition of its workings. The writer says that the system "includes a plan by which communication may be had by anybody by paying a toll of a nickel." If this is so, electricity is truly the poor man's friend, yet, when we stop and think how wonderfully complicated must be a system in which the subtle force accomplishes such startling results, we are lost in mute admiration!

The North-western Overland Telephone and Telegraph Company, whose headquarters are in this city, held a meeting on the 19th and added to their directory list the names of Judge Carey, F. W. Peck and Henry J. Christoph, all capitalists. The officers are: W. L. Peck, president; Byron P. Moulton, vice-president; C. M. Henderson, treasurer; Oscar Crandall, secretary; directors, W. L. Peck, C. M. Henderson, Edson Keith, B. P. Moulton, Ferd. W. Peck, Louis Wampold, H. J. Christoph, Eugene Carey, A. L. Bartlett, Wm. A. Fuller, John M. Garfside. A meeting of stockholders is to be called, with a view to commence operations at once. The company claims that they already have 2,000 pledged subscribers in the city.

The funny business at Milwaukee has been once more rolled over, and the underside appears now to be well sun-dried and ventilated. For several weeks the city was filled with rumors of a very damaging character, involving the Dorsett people, the members of the council, and several other outside parties. Bribery was openly charged; the retort courteous was followed by the denial direct, the re-butter positive, and the sur-re-butter offensive, until it became necessary for the council to take steps in the matter. An investigation was ordered, which included the individual examination of the parties, with a sort of star chamber exclusiveness. Following this, Mr. Dorsett was summoned before the committee, on the 20th instant. The special correspondent of the Chicago *Times* shows how the whole matter terminated in thoroughly vindicating Mr. Dorsett, and explains how, according to an old story, something as black as a crow, or a crow thrown up by a sick patient, became three black crows, after the story had undergone three or four repetitions. He says:

"The Investigating Committee of the Common Council had this afternoon an opportunity of hearing Mr. Dorsett's side of the story in the conduit scandal. The examination of the witness was held in the Council Chamber, and partook more of the nature of a social reunion than of a formal investigation. The committee resembled manufacturing establishments using bituminous coal. The witness smoked between answers; the stenographer puffed away as occasion served between his pot-hooks and curves, and thus in smoke the investigation ended. Mr. Dorsett flatly and unequivocally denied ever having had any conversation with Rosenkrans, Dewy or Hanchett, which could be tortured into an assertion that he had bribed any member of the Common Council, or attempted to do so. He said that before leaving Chicago to-day he had been met by Mr. Hanchett at the depot, who claimed that all the frauds, or attempts at fraud, had been instigated by Rosenkrans. In regard to the stock said to have been promised to Dr. Marden, witness said he had received a letter from Rosenkrans, in which the latter said he had pledged five shares of stock to a certain person, for services in securing the passage of the ordinance. Witness had sent a reply limiting the stock thus used to ten shares, but did not understand then or now that this stock was to be given to any member of the council. In conclusion, witness gave an explanation of how the story that $20,000 worth of stock had been used in bribery, of which so much use has been done, might have originated in a conversation with President Hinsey, of the council. Witness said the former expressed himself as being first for the city and next for the St. Paul road, and intimated that there was a Northwestern African lodged in some corner of the conduit pipes. Witness then told him that he would see that the St. Paul people, if they wished, or any of their friends, should have $15,000 or $20,000 worth of stock. From this incident, in the opinion of the witness, the later extravagant stories originated. The committee were satisfied with Mr. Dorsett's explanation, and will report accordingly."

The ordinance will now be repealed in toto, at the next meeting, the order for this move having passed its second reading unanimously, at the last meeting. Another ordinance is now before the Judiciary Committee, to which there seems to be no opposition, and which is so worded that any future log-rolling, or offensive partisanship engineering, will be powerless. It will preclude the possibility of any but the Dorsett system being put in under this franchise.

S. G. Lynch, 144 La Salle street, quotes telephone stock values as follows:

Chicago	$375	@	$400
Central Union	50	@	52
Michigan	65	@	67
Iowa Union	15	@	18
Great Southern	25	@	30
Colorado	18	@	20
Rocky Mountain Bell	40	@	45
Mo. & Kas.	52	@	54
United	15	@	17
Cumberland	70	@	75
Wisconsin	110	@	112

CHICAGO, Jan. 26, 1886.

BOSTON ELECTRICAL NEWS.

A company is being formed to establish a central station for the distribution of power by electricity in this city. Daft motors will be used capable of supplying, in all, 500 horse-power.

It is rumored that a central station, to supply incandescent lights in Malden, will be begun this spring. The long talked-of central station to supply the Backbay section of Boston with incandescent lights will be built in the near future, as the company have Armington & Sims engines on hand, and have ordered tubular boilers furnished with Jarvis setting.

The Thomson-Houston Electric Light Company, of Brockton, are talking of adding to their plant a Daft dynamo and motors to supply power. The company will add an additional Armington & Sims engine.

On February 1st, the Portland and Lewiston Divi-ions of the New England Telephone Company will be consolidated, Mr. J. D. Stanford, formerly superintendent of the Lewiston Division will be in charge. The new Division will be called the Portland Division.

A test in evaporation, recently made in a mill near Boston, has caused considerable amusement among steam users. It seems the mill was running with plain tubular boilers. As the boilers were old they decided to put in a battery of sectional water-tube boiler alongside, but found, after the new boilers started, the steam they made was so saturated with water that they could not run their engines as formerly. So they changed back to the old tubular boilers. The makers of the sectional boiler, not liking this, offered to make a competitive test at their own expense to show the economy of the sectional boiler over the old boiler. An expert was engaged to make the test and the result was that the old boilers beat the new type boilers.

The Boston Electric Protective Association, 56 Summer street, are giving their establishment a thorough refitting. A new battery room of large size replaces the old one at the lower part of the building. This room is at the top of the building, and is at present supplied with battery power amounting to 400 cells, with a capacity for 700 cells There are no wires excepting those required to connect adjacent cells in this room, the circuits being run on the partition in the passageway. Every circuit can be tested in the operating room, where by means of a switch-board the cells can be coupled in any desired number. Nine extra sections of cells are in working order to meet any special requirements of the system or to replace exhausted cells. Attachments are provided for filling the cells while in position. The Crowfoot battery is used for long circuits and the Leclanche for local circuits. The company is rapidly placing its protective system in stores and warehouses.

The Electrical Development Company are busy with the manufacture of Fuller-Wood lamps, having just shipped 100 to New York. With the establishment of a District Messenger Company, at Gloucester, using 200 of their messenger boxes, and the prospect of a company in Worcester, the increasing popularity of this system in this section is clearly shown.

The Thomson-Houston Company are at work on a plant for Youngstown, O., 180 lights; the number of lights used at Terre Haute, Ind., will be 180 instead of 60 as reported. A 45-light plant has been shipped to Milan, Italy, and a 15 light dynamo to Palermo, Italy; machinery to furnish 180 more lights for the same place is in process of construction.

The Enos Elevated Electric Railway Company, No. 1 Pemberton square, are actively engaged on the details for their at Winthrop. The single motor shown on the model in the experimental room will be replaced in full sized cars by four motors; two on each of the two driving wheels. The Winthrop Road, the length of which is to be 5½ miles, is expected to be finished June 1. It will cost not over $15,000 per mile to build and equip this system, while ordinary surface horse-car roads cost about $20,000 per mile. The cars complete with motors cost $1,600 each, and have room for 22 passengers seated or 30 when completely filled. The switches used will be plain turn-tables, the connections for the wires being made at base in such a way that the circuit is never broken. The system in this case will be of the "low type," *i. e.*, the cars will be within two feet of the ground, while the step is as near the ground as that of an ordinary horse car. The structure, the posts of which are 56 feet apart, has top and bottom rails, the lower one being always 14 feet from the ground as required by law. The wheels of the truck, which contain the motors, rest on the upper rail and the car is suspended by two beams from the truck. The wheels which run on the lower rails steady the car to such a degree that almost any speed could be attained without danger of vibration. The lower rail is used as a positive, and the upper as a negative conductor. Good contacts are obtained by the pressure of the wheels on the track due to the weight of the car. The lower wheels press firmly by means of springs. The posts for the truss-work are 12 by 20 inches, and are placed on the edge of the sidewalk, taking up no more room than a lamp-post The cars will be lighted as well as moved by electricity, and from the showing made by the road at Baltimore, using electricity for motive power, the expense of power for running the cars will not exceed ½ of that necessary for horse-car lines. To carry the current are iron rails 28 pounds to the yard placed on a copper plate weighing 4 pounds to the yard, thereby obtaining the necessary conductivity by a rails strong enough mechanically. The bearing section of the rail is round and the edge of the wheel is hollow. There is a tendency, therefore, for the wheel and rail to be free from dirt or rust which might impair the conductivity of the contact. The ends of the rails are connected by a special air-tight fish plate invented J. A. Enos, electrician of the company. Twenty cars will be first used at Winthrop.

BOSTON, Mass., January 27.

It will be to the interest of every practical worker in the electric lighting field to be present at the meeting of the National Association, in Baltimore, February 10th. There has been a gratifying increase in membership in the Association, particularly during the past few weeks, and as the date for the annual meeting is but ten days distant all others who contemplate joining should at once send word to President Morrison at Baltimore.

Bell Telephone sold at 162 this week. The company is daily expecting a decision from the Supreme Court in regard to the Indiana law regulating the rental of instruments in that State. The gross output of the company for the month ending January 20, 1886, was 2,780 instruments, the number returned was 1,548, making the actual net output 1,232. Last year, during the corresponding period, the gross output was 2,186 and the number of instruments returned 2,484, leaving an actual decrease of 298, so that the net figures this year show a total gain of 1,530 instruments.

Telephonic News

⁂ The editorials of the daily press just now are filled with erudite comments on telephone matters—legal, technical and political.

⁂ The Pan Electric Telephone Company opened its exchange in St. Louis last week, and commenced business with several subscribers.

⁂ The Baltimore and Ohio Telegraph Company are suing to compel the Chesapeake and Potomac Telephone Company to place a telephone in their office at Baltimore.

⁂ At a meeting of the Edinburgh Town Council, approval was given to a recommendation of the Plans and Works Committee that telephone be substituted for telegraph communication between the head police offices in Edinburgh and Leith.

⁂ A man at the telephone shouted, "Hello, there; why in thunder don't you speak louder?" An angelic voice replied, "What did you say?" "Oh!" exclaimed he, recognizing the voice of the daisy at the central office, "excuse me; I thought I was talking with my wife."

⁂ The special meeting of the stockholders of the New England Telephone Company, to consider the recently-published concession by the Bell Telephone Company of some of its rights under the original contract, will be held in New York on February 2. In the meantime, the feeling of opposition to the new plan seems likely to grow to proportions that will be fatal to its ratification.

⁂ "Pa," said Olivia, "we ought to have a thermometer in the house. We don't—" "There now," shouted the old man with the air of one who closes the discussion. "I don't want to hear another word about it. If ye had one ye couldn't talk through it. Lem Haskins had one put in his house nigh a month ago, an' he's hollered himself hoarse an' they're nigh about starved to death, tryin' to order their groceries through it. No good, I tell ye."

⁂ At the annual meeting of the stockholders of the Pennsylvania Telephone Company, the following directors were elected for the ensuing year: Hon. Francis Jordan, A. R. Shellenberger, Charles James Bell, Michael Schall, John L. Wilson, Charles R. Truex and C. J. French. At a subsequent meeting of the board, the following officers were chosen: Hon. Francis Jordan, president; A. R. Shellenberger, vice-president; Wm. Ker, general manager; M. H. Buehler, secretary and treasurer.

⁂ Solicitor-General Goode has received from the Interior Department all the papers bearing on the case of the Bell Telephone Company. He says that he will probably direct the institution of a suit to test the validity of the Bell patents this week. He has not yet decided where the suit shall be brought, but is understoood to prefer Washington as the most convenient place for the purposes of the Government. The Attorney-General has declined to take any part in the case, and has placed its entire management in the hands of the Solictor-General.

⁂ As an indication of the renewed interest in the telephone in England, we publish the following: On the 30th ult. the mayor of Keighley formally opened the new telephone exchange, which has just been completed in Keighley by the National Telephone Company. There were present several directors of the company, and a number of the leading gentlemen of the town. The mayor sent the first message to the mayor of Bradford, congratulating him upon the opening of the communication between the two towns. Several speeches were made, and messages were also exchanged with other towns in the West Riding, with which Keighley is now in telephonic communication.

⁂ A joint meeting of the Committee of Fire Department and Committee of Ordinances of the Minneapolis City Council will be held at the Council Chamber in Minneapolis, on Thursday, Jan. 28th, at 10 o'clock A. M., for the purpose of considering propositions and suggestions from all parties operating or constructing telegraph, telephone or electric wires, cables or conduits. The city purposes to adopt, at an early day, some plan for placing all wires underground.

⁂ It is now understood that the Attorney-General has decided to bring the Bell telephone suit before the courts of the District of Columbia. Commissioner Montgomery favored Boston, as the company was organized under the laws of Massachusetts, and has a legal existence there. Some of the parties interested wanted Memphis, but at the Department of Justice the impression prevails that it will be best to make Mr. Bell defendant, as agent for the company, and, his residence being in Washington, this will be the place to bring the action.

⁂ The Providence, R. I., Council, at their meeting last week, adopted the following: *Resolved*, That the Joint Special Committee, created by resolution 178, approved May 6, 1885, is hereby authorized to visit the cities of Chicago, Washington and Philadelphia for the purpose of examining the systems of underground wires then in use; and the sum of $500 is hereby appropriated for that purpose, such sum, or so much thereof as may be necessary to be paid from any money in the treasury not otherwise appropriated.

⁂ The Queen of the Belgians is prevented from attending the theater till the court period of mourning for the late King Alfonso, of Spain, is over. Meantime she assuages the paroxysms of her grief by listening to the theatrical performances through a telephone, which she has placed in communication with the theater. Princess Victoria, of Sweden, has had her private apartments put in telephonic communication with the chapel of the royal palace, as the state of her health no longer permits her to assist in person at the celebration of the divine offices.

⁂ The telephone system was introduced into Los Angeles in 1880, and in 1883 it was merged into the Sunset Telephone Telegraph Company a corporation controlling all the telephone lines on the Pacific Coast. There are 410 instruments in Los Angeles City and nineteen in the country, Pasadena has an exchange of thirteen subscribers, and San Gabriel has fifteen subscribers. This is an increase in two years from 150 in Los Angeles and ten in the country. Eleven messenger boys are employed, a large increase over two years ago. The company will move into their new quarters next week at 17 North Main street. A new multiple switching board of 600 numbers will then be used.

⁂ Mr. O. E. Madden, who was assistant general manager of the Bell Telephone Company from 1868 until last year, is reported as speaking as follows of Secretary Lamar's decision: "The Secretary's decision was hardly a surprise to me, although I have a strong belief in the justice of the Bell case. The entire structure of opposition to the Bell patents is based on charges of fraud designedly committed to secure large profits. What I see in such a charge is the necessity for an incentive. Mr. Bell never had any idea, when he filed his patent claim, that it would grow into such an enormous value. Why, to show you how little idea any one had of the telephone in its early stages, I have only to go back to 1868, when I joined the company. I had been taking a year's rest, made necessary by overwork. When I came to tell my friends of my intention, they started the story, which many of them thought might be true, that I was afflicted with softening of the brain. Some of them have since wished that they were similarly afflicted."

⁂ The attorney of Elisha Gray says, referring to the new telephone company:

"It will be a Chicago enterprise, and the headquarters will be here. The object is to protect Prof. Gray and prosecute his case. The capital is $10,000,000, and the commissioners are Elisha Gray, N. B. Judah and N. E. Swartwout. The organization will be perfected without delay. The local company will be very nicely situated to carry on business, as Prof Gray and his associates own the underground conduit already in, and it will not take long to put in a complete telephone system. Sub-companies will be organized throughout the country on the same general plan as those now in existence. Whatever results from this controversy, the people cannot help being greatly benefited by getting a better service at a cheaper price. I take it that the people of this country would be perfectly willing to have the man who has made the laws of nature flexible to his will, receive not only the praise and the honor, but financial results from such a magnificent invention. In short, we intend to prosecute Prof Gray's rights through to a final adjudication, if necessary before the Supreme Court of the United States, and we have ample capital to do it with."

⁂ One of the attorneys who is engaged in contesting the Bell telephone patents is a character. He is the Italian attorney of Meucci, the inventor, who lives in the old Garibaldi cottage on Staten Island. His name is M. Lammi. He mingles law with the importation of Italian produce, for the sale of which he has a place on Liberty street. A short pudgy man, with silken black whiskers, he has a smiling countenance. He was with Garibaldi in all the military movements by which that patriot insured the liberty of Italy, and bears nineteen wounds. The most serious of these was caused by a bullet which struck him in the breast and followed a rib around his body, coming out at the back. He had also a serious wound in the right wrist by which his arm was made useless for two years. He regained power over it through gymnastic exercises and horseback riding. Although Mr. Lammi is as mild a mannered man as the famous old time rover of the seas, it is reported that he has fought no less than five duels.

Telephone Rates of the Southern New England Company.

Regarding the raise in telephone rates in his territory, President Tyler, of New Haven, is reported as saying: "We are now considering methods of approximating exact justice for all the subscribers of the Southern New England Telephone Company, and shall decide on some plan of equalizing the charges. There will be no change in the fee for instruments in residences, but there must be an increase in the income from instruments in business houses; for with $1,500,000 invested, our gross earnings in the last eighteen months were but $275,000, yielding less than 5 per cent. on the capital invested. Of our capital, $525,000 has been paid to the American Bell Telephone Company for the privilege of doing business, and the greater part of the remaining $975,000 is actually invested in a plant which cannot be used for any other purpose. The Chesapeake and Potomac Telephone Company, with 4,000 subscribers, earns $300,000 a year, and the New York and New Jersey Telephone Company, with 5 000 subscribers, earns $400,000 a year; but the Southern New England Telephone Company, with 5,500 subscribers, earns only $275,000 per year. Our advance on rentals will apply only to business houses connected with the four leading exchanges of New Haven, Hartford, Waterbury and Bridgeport, and the maximum rental will be $100 per year. We expect but few additional subscribers except as the population increases, as about all who wish or can afford telephones already have them. We now have 5,500 subscribers to our company, and thus have 1.7 telephones to every square mile in the State, one telephone to every 121.6 people, and one telephone to every 25 voters in the State. The average cost to subscribers is less than the postage on a note and on a reply would amount to, and the cost of each message to many of the subscribers is less than one cent. At present the company has 80 exchanges in various portions of the State, having recently abolished several of the smaller country exchanges."

In reply to a question concerning the probable effect of an adverse decision by the United States courts respecting the Bell patents, Mr. Tyler said that such a decision would undoubtedly decrease the running expenses of the Southern New England Company some 30 or 40 per cent., and added that the costs for subscriptions would be correspondingly lessened.

The Development of Aluminum.

PART OF THE ANNUAL ADDRESS DELIVERED BY PRESIDENT J. A. PRICE BEFORE THE MEETING OF THE SCRANTON BOARD OF TRADE, MONDAY, JANUARY 18, 1886.

Iron is the basis of our civilization. Its supremacy and power it is impossible to overestimate; it enters every avenue of development and it may be set down as the prime factor in the world's progress. Its utility and its universality are hand in hand, whether in the magnificent iron steamship of the ocean, the network of iron rail upon land, the electric gossamer of the air or in the most insignificant articles of building, of clothing and of convenience. Without it, we should have miserably failed to reach our present exalted station, and the earth would scarcely maintain its present population. It is, indeed, the substance of substances. It is the Archimedian lever by which the great human world has been raised. Should it for a moment forget its cunning and lose its power, earthquake shocks of the wreck of matter could not be more disastrous. However axiomatic may be everything that can be said of this wonderful metal, it is undoubtedly certain, that it must give way to a metal that has still greater proportions and vaster possibilities. Strange and startling as may seem the assertion, yet I believe it nevertheless to be true, that we are approaching the period, if not already standing upon the threshold of the day, when this magical element will be radically supplanted and when this valuable mineral will be as completely superseded as the stone of the Aborigines. With all its apparent potency, it has its evident weaknesses; moisture is everywhere at war with it, gases and temperature destroy its fiber and its life; continued blows or motion crystallize and rob it of its strength and acids will devour it in a night. If it be possible to eliminate all, or even one or more of these qualities of weakness in any metal, still preserving both quantity and quality, that metal will be the metal of the future.

The coming metal, then, to which our reference is made, is aluminum, the most abundant metal in the earth's crust. Of all substances, oxygen is the most abundant, constituting about one-half; after oxygen comes silicon, constituting about one-fourth with aluminum third in all the list of substances of the composition. Leaving out of consideration the constituents of the earth's center whether they be molten or gaseous, more or less dense, as the case may be, as we approach it, and confining ourselves to the only practical phase of the subject—the crust, we find that aluminum is beyond question the most abundant and the most useful of all metallic substances.

It is the metallic base of mica, feldspar, slate and clay. Professor Dana says: "Nearly all the rocks, except limestones and many sandstones are literally ore-beds of the metal aluminum." It appears in the gem, assuming a blue in the sapphire, green in the emerald, yellow in the topaz, red in the ruby, brown in the emery, and so on to the white, gray, blue and black of the slates and clays. It has been dubbed "clay metal" and "silver made from clay;" also when mixed with any considerable quantity of carbon becoming a grayish or bluish black "alum slate."

This metal in color is white and next in luster in silver. It has never been found in a pure state, but is known to exist in combination with nearly two hundred different minerals. Corundum and pure emery are

ores that are very rich in aluminum, containing about fifty-four per cent. The specific gravity is but two and one-half times that of water; it is lighter than glass or as light as chalk, being only one-third the weight of iron and one-fourth the weight of silver; it is as malleable as gold, tenacious as iron and harder than steel, being next the diamond. Thus it is capable of the widest variety of uses, being soft when ductility, fibrous when tenacity, and crystalline when hardness is required. Its variety of transformations is something wonderful. Meeting iron, or even iron at its best in the form of steel, in the same field, it easily vanquishes it at every point. It melts at 1,300 degrees Fahr., or at least 600 degrees below the melting point of iron, and it neither oxydizes in the atmosphere, nor tarnishes in contact with gases. The enumeration of the properties of aluminum is as enchanting as the scenes of a fairy tale.

Before proceeding further with this new wonder of science which is already knocking at our doors, a brief sketch of its birth and development may be fittingly introduced. The celebrated French chemist, Lavoissier, a very magician in the science, groping in the dark of the last century, evolved the chemical theory of combustion—the existence of a "highly respirable gas," oxygen, and the presence of metallic bases in earths and alkalies. With the latter subject we have only to do at the present moment. The metallic base was predicted, not yet identified. The French Revolution swept this genius from the earth in 1794, and darkness closed in upon the scene, until the light of Sir Humphrey Davy's lamp in the early years of the present century again struck upon the metallic base of certain earth, but the reflection was so feeble that the great secret was never revealed. Then a little later the Swedish Berzelius and the Danish Oersted, confident in the prediction of Lavoissier and of Davy, went in search of the mysterious stranger with the aggressive electric current, but as yet to no purpose. It was reserved to the distinguished German, Wohler, in 1827, to complete the work of the past fifty years of struggle, and finally produce the minute white globule of the pure metal from a mixture of the chloride of aluminum and sodium, and at last the secret is revealed—the first step was taken. It took twenty years of labor to resolve the mere discovery into the production of the aluminum bead in 1846, and yet with this first step this new wonder remained a fœcus undeveloped in the womb of the laboratory for years to come.

Returning again to France some time during the years between 1854 and 1858, and under the patronage of the Emperor Napoleon III., we behold Deville at last forcing nature to yield and give up this precious quality as a manufactured product. Rose, of Berlin, and Gerbard, in England, pressing hard upon the heels of the Frenchman, make permanent the new product in the market at $32 per pound. The despair of three quarters of a century of toilsome pursuit has been broken, and the future of the metal has been established.

The art of obtaining the metal since the period under consideration has progressed steadily by one process after another, contantly increasing in powers of productivity, and reducing the cost. These are intensely interesting to the student, but must be denied more than a reference at this time. The price of the metal may be said to have come within the reach of the manufacturing arts already.

A present glance at the uses and possibilities of this wonderful metal, its application and its varying quality, may not be out of place. Its alloys are very numerous and always satisfactory; with iron producing a comparative rust proof; with copper the beautiful golden bronze, and so on embracing the entire list of articles of usefulness as well as works of art, jewelry and scientific instruments.

Its capacity to resist oxydation or rust fits it most eminently for all household and cooking utensils, while its color transforms the dark-visaged, disagreeable array of pots, pans and kitchen implements into things of comparative beauty. As a metal it surpasses copper, brass and tin in being tasteless and odorless; besides being stronger than either.

It has, as we have seen, bulk without weight, and consequently may be available in construction of furniture and house fittings, as well in the multitudinous requirements of architecture. The building art will experience a rapid and radical change when this material enters as a component material, for there will be possibilities such as are now undreamed of in the erection of homes, public buildings, memorial structures, etc., etc., for in this metal we have the strength, durability and the color to give all the variety that genius may dictate.

And when we take still a further survey of the vast field that is opening before us, we find in the strength without size a most desirable assistant in all the avenues of locomotion. It is the ideal metal for railway traffic, for carriages and wagons. The steamships of the ocean of equal size will double their cargo and increase the speed of the present greyhounds of the sea, making six days from shore to shore, seem, indeed, an old-time calculation and accomplishment. A thinner as well as a lighter plate; a smaller as well as a stronger engine; a larger as well as a less hazardous propeller, and a natural condition of resistance to the action of the elements, will make travel by water a forcible rival to the speed attained upon land, and bring all the distant countries in contact with our civilization to the profit of all. This metal is destined to annihilate space even beyond the dream of philosopher or poet.

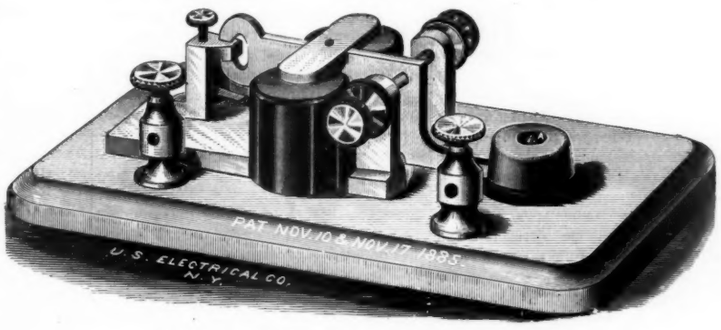
The tensile strength of this material is something equally wonderful, when wire-drawn reaches as high as 128,000 pounds, and under other conditions reaches nearly, if not quite, 100,000 pounds to the square inch. The requirements of the British and German governments in the best wrought steel guns reach only a standard of 70,000 pounds to the square inch. Bridges may be constructed that shall be lighter than wooden ones and of greater strength than wrought steel and entirely free from corrosion. The time is not distant when the modern wonder of the Brooklyn span will seem a toy.

It may also be noted that this metal affords wide development in plumbing material, in piping, and will render possible the almost indefinite extension of the coming feature of communication and exchange—the pneumatic tube.

The resistance to corrosion evidently fits this metal for railway sleepers to take the place of the decaying wooden ties. In this metal the sleeper may be made as soft and yielding as lead, while the rail may be harder and tougher than steel, thus at once forming the necessary cushion and the avoidance of jar and noise, at the same time contributing to additional security in virtue of a stronger rail.

In conductivity this metal is only exceeded by copper, having many times that of iron. Thus in telegraphy there are renewed prospects in the supplanting of the galvanized iron wire,—lightness, strength and durability. When applied to the generation of steam this material will enable us to carry higher pressure at a reduced cost and increased safety, as this will be accomplished by the thinner plate, the greater conductivity of heat, and the better fiber.

It is said that some of its alloys are without a rival as anti-friction metal, and having hardness and toughness fits it remarkably for bearings and journals. Herein a vast possibility in the mechanic art lies dormont—the size of the machine may be reduced, the speed and the power increased, realizing the conception of two things better done than one before. It is one of man's creative acts.



THE TOUCH SOUNDER OF THE U. S. ELECTRICAL CO.

The Sensophone, or Touch-sounder.

This instrument, which is patented in the United States and foreign countries, is claimed to be the only one ever perfected by which a telegram can be received by the sense of touch, the patents being owned by the United States Electrical Company, of this city. By placing the finger upon the touch point *A*, this receiver will deliver the message to the operator by a series of light pricks, caused by a vibrating needle, being identical with the ticks made by sound. Experts who have tested the instrument affirm that they can receive faster and with greater accuracy than by sound. For those who have learned to read by sound, this instrument offers no obstacle. By removing the finger, the instrument resumes its functions as a sounder: thus the utilization of two senses are combined. The opening of a new sense in the art of telegraphy offers a field of usefulness to deaf mutes, whose sense of touch is particularly sensitive.

.... A concession has been granted by the Swiss Government to a firm of electrical engineers at Geneva for making a railway up Mount Salene, near that place. The line will be made with a central track very similar to that of the Righi line, the toothed pinion which works into it being driven by machinery.

.... For the purpose of securing certain bonds or debentures of the company, aggregating £600,000, or $3,000,000, the Commercial Cable Company has executed a trust deed of the franchises, rights and cables to Ernest W. Siemens and Johann C. L. Loeffler, of Berlin, Germany, and Westminster, England, respectively.

.... Benjamin Hatch, telegraph operator at East Weymouth, Mass., was accosted by two men one night, who demanded a sum of money known to be in the office, backing up their request with a cocked revolver. For an instant Hatch was nonplussed. Then he quickly whipped out a revolver, thrust it into the robber's face and shouted, "Ah, I'm on to your little racket!" The robber dropped his revolver, and hurriedly backed out of the office. His companion had remained in the sitting-room, near the stove. Covering the pair with his revolver, Hatch proceeded to the depot door, cut off their exit, and demanded to know what they wanted. The spokesman replied that he wanted to telegraph. "All right," said Hatch, "sit down on the chair and write your message." "I don't want to telegraph," replied the rascal, and seizing the opportunity, as Hatch moved away from the door, he threw it open and dashed out, followed by his companion. Hatch ran to the door and fired after them as they disappeared in the darkness.

TELEGRAPHIC

.... A portion of the shovel works at Easton, Mass., is lighted by electricity, as is also Gilmore's hinge factory.

.... Two days last week San Francisco was entirely cut off from telegraphic communication with the outer world, a heavy storm having prostrated all the wires.

.... Taquin and Ettieyhausen, in Vienna, in 1836, erected an electric telegraph, the wires being partly overhead and partly underground.

.... An American District Telegraph Company is being organized in Topeka, Kan., with J. D. Parish, president, and R. B. Gemmell, treasurer. Several messengers are now employed.

.... The Postal Telegraph Cable Company yesterday filed articles of incorporation with the following trustees: James H. Withington, A. P. W. Seaman, George Steel, George E. Kent and John Stevens.

.... A new electrical firm, composed of enterprising young men, has been established at No. 111 Berkeley place, Brooklyn, composed of Messrs. McKay & Beetle. They make a specialty of electric bell work, and all kinds of interior wiring.

.... A meeting of the directors of the Atlantic Telegraph Company was held at their office on Exchange street, Portland, Tuesday afternoon, to organize. Mayor John W. Deering was elected president. The following were chosen the Executive Committee: J. F. Kimball, president of the Appleton National Bank, Lowell, Mass.; John P. Donovan, of Lowell; Parker C. Chandler, of Boston; T. G. Gerrish, of Lowell; and John W. Deering, of Portland.

.... Judge Barrett decided in Supreme Court Chambers, not to set aside the sale of the property of the Bankers and Merchants' Telegraph Company, and consequently refused to put the property back into the hands of receivers. In his opinion, Millard R. Powers, the intervening bondholder, who moved to set aside the sale, had been guilty of gross neglect in failing to object to it before the present time, and to grant his motion would be to practice oppression on the bondholders who approved the sale and the persons who acquired the property.

... The Serial Building, Loan and Savings Institution, an association composed of telegraph operators, held an election of officers and directors last week, at which the following were elected: James Merrihew, president; E. F. Howell, vice-president; A. R. Brewer, treasurer; William B. Marsh, secretary; J. B. Sabine, attorney for New York; A. A. Rich, attorney for New Jersey. Directors—John Van Horne, D. B. Mitchell, Charles P. Burch, E. F. Cummings, M. J. O'Leary, W. B. Waycott, Gardner Irving, William Holmes, J. M. Phelan, George Dauler and John Brant.

.... Joseph C. Laviolette, of Brooklyn, is suing the Western Union to recover $2,000 damages. The complainant alleges that in August last he went to Poughkeepsie to meet his son, who was coming from Syracuse. At Poughkeepsie he received a telegram, sent through the Western Union, which read thus: "Mr. Scanlon, detective of railroad company. Please tell Laviolette that his son is dead." This, the plaintiff claims, caused him much anxiety, and he immediately telegraphed to Syracuse to ascertain whether the telegram was correct, but that the company failed to deliver it, and in consequence of the failure to deliver, his agony was not only intensified, but he was compelled to go to Syracuse to gain the information sought. When he reached Syracuse, he found that his son was not only alive, but he had departed to meet him at the specified place. He returned to his home in Long Island City, where he found his son.

ELECTRICAL AND SCIENTIFIC

* * A Brooklyn gentleman has made a platinum wire which is said to be "too fine to be seen with the naked eye."

* * The Walter Electric Company, of Cincinnati, Ohio, has been organized with a capital stock, $10,000. The incorporators are Richard R. Pullan, and others.

* * Eight thousand men are engaged on the thirty-one mile tunnel stretching from Croton lake to the reservoir in Central Park, New York, and which, when finished, will be the longest tunnel in the world. It will have cost by that time anywhere between $33,000,000 and $60,000,000.

* * According to *Cosmos les Mondes*, the number of lightning strokes in Saxony has increased steadily during the last twenty-three years. The annual cases from 1859 to 1862 were 67; from 1863 to 1866, 81; and from 1879 to 1882, 189. The destruction of the forests is supposed to be one of the causes of this alarming increase.

* * A boiler has been made in France in which the metallic surface exposed to fire does not touch the water. The boiler, it is said, cannot become red hot, but is enveloped all over by the same temperature. The vaporization is said to be very great, and the last drop of water can be converted into steam without any danger of explosion.

* * An Italian ship has been sheathed with glass plates, cast like iron plates, so as to fit the hull, to take the place of copper sheathings. The joints of the plates are made water-tight by use of waterproof mastic. The advantages claimed for glass over copper are its insensibility to oxydation and its exemption from incrustation.

* * The New Orleans Exposition management has at last admitted that it is in great financial straits, and has appealed to the City Council for an appropriation to enable them to carry the enterprise through the time fixed for its continuance. The proposed appropriation meets with public approval, and will probably be made.

* * A new discovery is that, by the simple use of citric acid or citrate of silver, sea water may be made drinkable. By this means chloride of silver is precipitated, and a harmless mineral water is produced. An ounce of citrate renders a half-pint of water drinkable. If the fact is sustained by experiment and analysis, the discovery is one of great value.

* * The Buckeye copper mine, near Blue Wing, N. C., resumed work last week after a short suspension. W. H. Spence is superintendent. A shaft has been sunk to a depth of thirty-five feet, and the vein carries a small portion of silver, but principally tetrahedrite, with traces of gold, assaying metallic copper 25 per cent. and between five and six dollars per ton in silver.

* * William Hines, in the employ of the Long Island division of the New York and New Jersey Telephone Company, while repairing the wires one day last week, was seriously injured by the falling of the pole on which he was at work. He fell thirty feet, breaking his left leg and severely straining his right hip. It is feared that he received internal injuries which may prove fatal.

* * The man who refuses to patronize the newspaper is the man of morbid disposition, of small ideas. His light, if he has any, is so completely concealed beneath the bushel of self, that it will never burn to any practical purpose, and may be extinguished without a single sigh from the world around. Such a person is known by his works. A spirit of liberality and benevolence never animates him, but he lives on, wondering at the success of others and bewailing his own hard lot.

* * The Department of State has been officially advised that the King of the Belgians has proposed an annual prize of 25,000 francs for the purpose of encouraging works of the mind, the competition to be open to all nations, and to be decided by a jury appointed by the King of Belgium, to consist of seven members, of whom three are to be Belgians and the remainder foreigners. The prize forming the object of the third mixed international competition will be adjudged in 1889 to the best work on the progress of electricity as a motive power and as a means of illumination, etc.

* * Among the interesting results of submarine or deep-sea explorations conducted under the auspices of the London Geographical Society are those in reference to the Atlantic sea bed. It would seem that the bottom of the North Atlantic is occupied by two valleys, the eastern extending from ten to thirty degrees west longitude, and traceable as far as the equator, with an extreme depth of less than 13,000 feet, while the western valley reaches from the thirtieth to the fiftieth degree of west longitude. The two are separated by a ridge in thirty degrees west longitude, along which the average depth is only 1,600 fathoms, and which can be traced northward to Iceland and southward to the Azores; it is volcanic in character at both extremities. Its extreme breadth is somewhat less than 500 miles, and the depth of the water increases on both sides of it according to the distance of the axis.

Potassium Iodide in Ozonoscopes.

This salt continues to be the chief essential agent in the variously modified tests for ozone, or for the excess of oxydizing activity represented by ozone in the atmosphere. Five or more ozonoscopes consist of iodide of potassium, with different proportions of starch; in one it is used with litmus, and in one it is used alone. Other tests, as the use of thallous oxyde, guaicum, silver foil and spectroscopic observation, have their several claims; but for stated observations of the atmosphere nothing obtains credit as a surer constant than a potassium iodide test, whatever may be the chemical uncertainties of its interpretation.* The value of any potassium iodide test depends on chemical qualities of extreme sensitiveness, co-existing with stability of the salt; and it is indispensable, first, that its quality be uniform, and next, that it be as near real purity as possible.

Absolute purity is a theoretical state, and its assertion brings in question with what minuteness of measurement can deviations from purity be measured. At all events, the attainment of uniformity is greatly favored, when all ozonoscopes used by a corps of observers are prepared together and distributed from a single office, year after year; and independent observers will do well to avail themselves of the test materials so provided.

The writer has no experience in application of tests for atmospheric ozone, but has some experience with iodide of potassium and its imperfections. As abundant as "chemically pure" grades of this salt are, an article which does not give immediate indication of impurity under ordinary chemical tests, is very rare. Of impurities (1) an alkaline reaction, from presence of carbonate, or less often, hydroxide, is frequently found in the "C. P." article. The medicinal article is always alkaline, and the pharmacopœial limit of alkalinity is hardly regarded, five representative samples giving, in 1883, respectively 0.74, 1.84, 0.05, 0.24, 0.04 per cent. of alkali, as carbonate. Alkalinity in proportion to its extent diminishes the sensitiveness of iodide of potassium and starch tests and of tests of iodide of potassium alone, while an approach toward alkalinity might be said to increase the delicacy of the test with iodide of potassium and litmus. Now the test for alkalinity of iodide to be used in an ozonoscope should be made with an exactness of the final chemical equilibrium, suited to a measurement of those faint chemical influences to be revealed by twelve-hour tests of the atmosphere. Then (2) regarding presence of iodate of potassium. This compound is a final result of the action of ozone, peroxide of hydrogen and numerous other oxydizing agents, upon potassium iodide. Traces of iodate, with iodide of potassium, cause a liberation of iodine on the slightest acidulation. Therefore when containing traces of iodate, a decided alkaline reaction is needful to prevent discoloraton in the air. The test for free iodine, given in Dr. Fox's Ozone, p. 184, with addition of acetic acid to very faint acidity, is in effect a test for iodate. Carbonic acid liberates iodine, and developes an alkaline reaction in iodide of potassium with a trace of iodate. It has been stated that pure iodide of potassium is acted upon by carbonic acid; but this probably lacks confirmation. Along with the iodate, revealed by the same tests, and of similar effect in ozonoscopes, may be counted any other oxy-salt of iodine, such as the hypo-iodite, which may be present as an impurity in iodide of potassium. As already mentioned, iodate is a later product of the special oxydizing agencies of the air in action with potassium iodide; therefore this salt may acquire traces of iodate by storage. Now, the tests for traces of iodate require careful estimation of the conditions of mass (concentration), temperature and time, and it may be suggested that parallel tests, for comparison with a salt of known purity, are desirable.

Chloride and bromide (3) are very hard to completely eliminate in making iodide of potassium. The chloride is so deliquescent that a very little of it has an appreciable hygroscopic influence on an ozonoscope; and both chloride and bromide, undoubtedly, directly modify the reactions liberating iodine, though they interfere much less than the impurities previously noticed. Both chlorine and bromine are carried in the iodine out of which iodides are made; their removal is not easy, and their detection in traces is quite difficult.

An exact experimental investigation into the effects of subtile impurities in the potassium iodide of ozonoscopes, the most favorable limits of variation, and the most efficient tests to fix these limits, would promise to be helpful to the important interests of meteorology.—A. B. PRESCOTT, in *American Meteorological Journal*.

* Readers of the chemical literature of Ozone find great convenience in the use of Prof. Leed's Indexes to the literature of Ozone and Peroxide of Hydrogen, with historical summaries, 1880 and 1883: Annals New York Academy of Sciences, i. 363, iii. 137.

The Telephone Controversy—The Short Way to End It.

Mr. Secretary Lamar concludes that, out of regard to high public interests, the Government should bring a suit to test the validity of the Bell telephone patents. This suit must, of course, be brought either in a District or a Circuit Court; and we may be sure that the party defeated, whether the Bell Company or the Government, will appeal to the Supreme Court of the United States, in order to obtain there a final decision.

Well, then, why does not the Government, instead of going to the trouble and expense of bringing this new suit in one of the lower courts, take hold of the first of the various suits which have already been decided below and are now pending before the Supreme Court? In these suits all the questions and issues which would have to be dealt with in any new suit, are not only raised, but have been carried through the lower courts, and await their turn in the Supreme Court.

The first of these cases is that known as the Dolbear case, No. 368 on the calendar. It was decided in the First Circuit in Boston by Judge Gray of the Supreme Court, sitting with Judge Lowell, and in the natural course it will probably be reached in November next. When it comes up, the court will also call up all the other cases which are pending on the same questions, and have them all argued at once. These cases contain every possible matter of controversy that has ever been raised on the Bell patents, and thus everything that could be considered in the new suit which Mr. Lamar proposes to have brought, can then be argued and determined.

Moreover, if Attorney-General Garland will now go into the Supreme Court and say that high public interests are involved in this matter, and that, accordingly, he requests that the hearing and decision of these cases should be expedited, the court will doubtless grant his request, and put No. 368 forward on the calendar, so as to hear and determine the whole controversy within the next two months, and thus put an end to all litigation upon the subject. In the final argument, the Attorney-General or Solicitor-General can himself appear and be heard, on the ground of the public concern regarding the patents.

Why, when all this is feasible, should Mr. Lamar or Mr. Garland wish to bring a new suit in some District or Circuit Court, where, in any event, a considerable time will be required to bring the case to a hearing and decision there, with all the subsequent delay of an appeal to the Supreme Court? Why should they prefer this roundabout course to the other, which is open to them, of having the whole controversy heard finally, within the next sixty days, by the court of last resort, and settled forever?

These are pretty searching questions, and we think that before the affair is allowed by the Administration to be developed any further, they should be very clearly answered.—*New York Sun.*

Artificial Light.

The meeting of the Society of Natural Sciences in Buffalo, at the last session listened to a lecture by Dr. Howe on "Artificial Light and its Effect on the Eye," which was illustrated by the spectrum and most of the various styles of artificial lights now in use. The lecturer first spoke of the rapid movement of light—192,000 miles in a second, and sought to illustrate by the wavy motion imparted to a rope stretched across the room the undulating theory of light. As in the rope, no particles moved forward, the ray of light being simply a mode of motion imparted from one particle to another.

The composition of white light was shown to be the seven prismatic colors, first by the rotating disc and afterwards by analyzing the light by means of a prism. Passing to artificial lights a number of these were shown—tallow and wax candles, student and Siemen's kerosene lamps, Bunsen's "fish-tail," and argand gas jets, and the incandescent electric light. Merely mentioning that combustion is the more or less rapid conversion of carbon into carbonic acid gas by the chemical combustion of the former with oxygen from the air, Dr. Howe took up a candle and pointed out the three portions of such a flame. The dark central part is unburned gas, as was shown by conducting it off by a tube and lighting it at the end of the tube; the luminous part, which consists of incandescent particles of carbon, and a narrow outer non-luminous part, which is really the burned carbon losing its light-giving power.

The defects of an artificial light may be summed up in the terms, dim, smoky, flickering, taking up oxygen, giving off heat. The candle was about valueless, as it gave but little light, and the open gas jet and the arc electric lamp were objectionable on account of their flickering or unsteadiness. The ideal light was the incandescent light, which was powerful and steady, absorbed no oxygen, and gave off very little heat.

Taking up a Bunsen gas lamp the Doctor referred to the small amount of light it gave and then greatly increased the light by blowing some lampblack, a form of carbon, into the tube so that it would rise into the flame, which at once became incandescent. He spoke of the much-praised student lamp as not remarkable for anything but its cheapness. Holding a drinking glass inverted over a candle flame it soon went out from the formation of carbonic acid gas to the exclusion of oxygen, thus showing the dangerous poison given off by lights formed from carbon.

Passing to the eye and its wonderful mechanism, the Doctor gave a number of views of the various parts by means of the magic lantern and an enlarged model of the eye. He dwelt upon the fibrous network used to enlarge or contract the size of the pupil, adding that the crystalline lens, by reason of its great adjusting power, was the most remarkable lens in existence, while the rod and cone structure of the retina was charac terized as the most complicated of organic substances.

Returning to the lights on the table the bright glare was spoken of as unpleasant and hurtful, because it irritated the delicate conjunctive, while the lamp, turned too high, offended another organ by the odor it gave off. The smoke, too, irritated the eye. The flickering light was objectionable, because it irritated the ciliary muscles and wearied them by keeping them constantly at work, contracting and enlarging the pupil or role in front of the eye.

Objection was raised against the red lamp shades that are so common; they were disagreeable and useless, for they made it necessary to produce more light than was needed in order to shut it off. A red light also gave off more heat than other colored lights. In the discussion that followed it was observed that the red end of the spectrum was less agreeable than the violet end, though it was hardly known why. Prof. Pitt believed that white shades were the only proper ones. Prof. Dusceak spoke of the curious confusion of the names of colors among Eastern tribes, especially of yellow, blue, and green, as though these simple people were unable to distinguish them.

Concerning an Electric-Light Mutual Insurance Company.

Editors Electrical Review:

The position taken by the board of underwriters of the insurance companies, in advancing the rates of insurance upon electric-light plants, on the ground of their being an extra hazardous risk, has induced us to investigate the question of mutual insurance. The experience of the mutual insurance companies insuring factory property of all kinds for the past fifty years, has clearly shown that mutual companies can furnish insurance for less than one-quarter the cost of the business as done by the stock companies. We believe that a mutual insurance company can be formed by all the local electric-lighting companies of the country, in such a way as to insure the plants for less than one-quarter what it now costs the companies for insurance.

We have conferred with the managers of the largest mutual insurance companies of New England, and they concur with us in all we have said. To enable us to lay this matter before the convention in Baltimore, in February, in an intelligent manner, so that the necessary action may be taken to organize the Electric-Light Mutual Insurance Company in proper form, we desire an immediate answer to the following questions, from all electric lighting companies:

1st. Would you be in favor of such an organization?

2d. Is the building your plant is in built of wood or brick?

3d. Is it more than one story in height, and if so, how is it occupied?

4th. What is the entire amount of insurance you are now carrying on your plant?

5th. Please state amount per year paid for such insurance?

6th. What the loss would be if totally destroyed by fire?

7th. State your losses by fire in each year since plant was started?

We feel deeply interested in this question, believing it will be largely beneficial to all local electric-lighting companies, and hope that you will answer promptly and fully the above questions, addressing us at New Haven.

Respectfully,

F. A. GILBERT, Prest.
J. ENGLISH, Treas.
(New Haven Electric Co.
(Bridgeport Electric Co.
(Newport Illuminating Co.

New Haven, Conn., Jan. 25, 1886.

The Judkins Train Signal.

This signal, invented by H. E. Judkins, of Boston, is intended to take the place of the bell-rope now in use on passenger trains. The inventor has had considerable railway experience, and became impressed with the demand for improvement on the methods ordinarily in vogue on railways. In this an open-circuit battery is located in some convenient place on the locomotive from which runs an insulated wire, and is permanently attached to each passenger coach, and being coupled between the engine and each coach with the Automatic Coupler. At convenient and accessible points in each coach are push-knobs for the purpose of transmitting to the engineer any desired signal—to start, stop or back the train. The signals thus transmitted are instantaneous and accurate.

In the illustrations, Fig. 1 is an elevation of one portion of the two-part coupling for uniting the sections of the conductors, of which certain portions are broken away to exhibit the construction more clearly. Fig. 2 is a vertical longitudinal section of the other portion of the same coupling, showing its internal construction. Fig. 4 represents the two parts of the coupling when united to form two electrically continuous conductors insulated from each other. Fig. 3 is the elevation partly in section of the dummy coupling and clip constituting devices for grasping and holding the open ends of the conductors at rear end of the train.

A number of railroads have adopted this invention, and praise its efficiency and reliability.

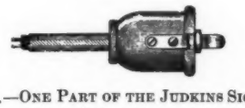


FIG. 1.—ONE PART OF THE JUDKINS SIGNAL COUPLING.

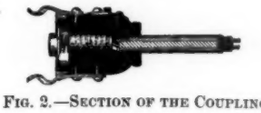
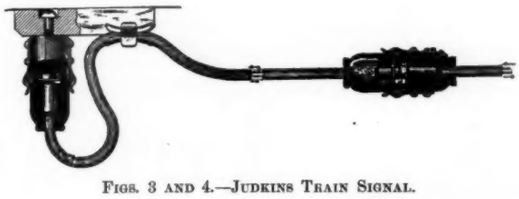


FIG. 2.—SECTION OF THE COUPLING.



FIGS. 3 AND 4.—JUDKINS TRAIN SIGNAL.

The First in Kansas.

We expected to have this office lit with the incandescent electric light last Christmas, but various causes have combined to keep us back till the present time. The office has been wired and ready for it about ten days, and the dynamo having arrived yesterday, and put in place, in fifteen minutes thereafter the light was put on.

The system is the Sawyer-Man, which is owned by the Consolidated Electric Light Company of New York. The lamp, which is the only thing about this lighting which is patentable, is believed to be the only real patent in existence. That used by Edison and other companies is said to be an infringement, and injunctions against their use are now pending in the courts of the country.

It is, we suppose, generally known that the light can be turned off and on, like gas, but no match is necessary to light, it being self-lighting.

The "plant" which we have belongs entirely to this office, and the dynamo which we have will generate electricity for one hundred more lights than we need. These will be furnished to some of our neighbors, if desired. We have ninety lights in this office, but it is not expected that over fifty will be in use at one time. Our friends are invited to call any evening and see the light. —*Topeka, Kan., Commonwea'th.*

—— Joshua K. Righter, secretary of the Reading Electric Light Company will have erected a three-story brick building on the east side of Seventh street between Franklin and Chestnut, to be used as the plant of the company.

—— The capacity of the present station of the Arnoux Electric Light Company, at No. 515 East Third street, Wilmington, Del., is being rapidly taken up by subscribers to the incandescent lights. As soon as it is wholly occupied, a new station will be built up-town to supply the northern and western parts of the city.

—— The contracting board, at its meeting recently in Troy, N. Y., decided to take no action in relation to the extension of the electric-light service until after the Common Council meets. The idea is to give the aldermen an opportunity to rescind the resolution ordering the entire city illuminated. A. E. Powers was present at the meeting of the contracting board, prepared to submit a bid.

—— Work at the building of the Newburgh Electric Light Company, on Montgomery street, is progressing rapidly, and the prospects now are that within a fortnight the streets will loom up with the arc system of electricity. The boiler has been set, the 45-light engine and dynamo are in position, and the lamps ready to be put in place. For the present but one dynamo will be used, although ample space has been reserved in the main room for a companion one, capable of supplying an equal number of lamps. The lamps on the street poles will be extended across the roadbed about twelve feet, cast-iron cranes being placed on each pole for this purpose. The company have commenced placing the cranes in position.

—— The annual meeting of the Manchester (N. H.) Electric Light Company was held last week, and the following board of directors elected: Person C. Cheney, James A. Weston, F. L. Higginson, Andrew Robeson, John B. Varick, Frank Dowst, Alonzo Elliott, Natt. W. Ellis and Charles Storrow were elected. Subsequently a vote was passed increasing the capital stock from $36,000 to $60,000. Person C. Cheney was elected president; Jas. A. Weston, vice-president; Joseph W. Hildreth, clerk, and Andrew Robeson, treasurer. A building committee, consisting of James A. Weston, Frank Dowst and Alonzo Elliott, was appointed, and steps in the direction of securing a site for a manufactory, where the power of the company will be generated, on Pennacook street, will at once be taken. Building operations will be commenced early the coming season.

—— The bill providing for the inspection, regulation and location of electric light wires was sent by the House of Delegates of St. Louis to the Council last Friday night. After it had been read a first time Mr. Blakely said that the bill had passed the House without the knowledge of the representatives of some of the electric light companies, which it affected very disadvantageously. They represented that the proposed inspection and fee would be a great hardship to them. For the inspection of each arc light and ten, or a fraction of ten, incandescent lights, a fee of $1, to be paid by the company or person owning the light, may be charged by the city. The inspection of the electric lights in the Exposition, under the bill, would cost $400. The matter seemed to be of considerable importance, and Mr. Blakely expressed the hope that the committee to which the bill would be referred after its second reading, would give the companies interested an opportunity of being heard in their own defence.

ELECTRIC LIGHT NEWS

—— In Baltimore gas is now 50 cents a thousand.

—— The electric light will be in operation in the Augusta cotton mills, Augusta, in a short time.

—— The Valido Marble Company, Fairhaven, Vt., has just received the machinery for running an electric light, with which the mill and cutting shop will be lighted.

—— The Mayor of Paterson, N. J., proposes to have his residence lighted by electricity; a very good example for other mayors as well as private citizens.

—— The Leatherboard Company, Saccarappa, Me., is making large additions to its factory buildings. Powerful engines are used for driving the machinery. This week the building is to be lighted by electricity.

—— In the case of the Brush Electric Company and John E Ridall *vs.* The Allegheny County Light Company, Pittsburgh, the defendant has filed an answer, consisting of general denials of the claims of the plaintiffs.

——Mr. Chas. A. Ross, of the Royal Electric Company, Montreal, spent several days in New York recently. Under the energetic and intelligent management of Wm. Lee and Charles A. Ross, the success of the Royal Company has astonished the conservative Canadians, and the company's business is constantly increasing.

—— An article was placed on record in St. Louis, last week, changing the name of the Guernsey and Scudder Electric Light Company to the Guernsey-Scudder Electric Light Company. There is also an amendment providing for five directors of the company in lieu of three, and the capital stock is increased from $13,000 to $65 000.

—— T. A. Edison has purchased a beautiful residence in Orange, N. J., and will reside there on the termination of the Florida trip that he and E. T. Gilliland contemplate taking next month. The Orange place was formerly owned by Henry C. Pedder, late editor of the *Manhattan Magazine*, who some time ago was compelled to leave the country on account of financial complications. Arnold, Constable & Co., of New York, to whom the property had been assigned upon Mr. Pedder's departure, have formally surrendered possession, and a brother of Mr. Edison is now residing there.

—— When the time came for starting the electric lights the other evening in Hoboken, the citizens were surprised to see them light up very slowly. The trimmer, instead of attending to his business of placing carbons, had endeavored to quench his thirst for strong drink so successfully that he had landed in the police station. As soon as this was learned, another trimmer was put to work, and the lamps, after some delay, illuminated as usual.

—— The arc lights at the passenger station were given their first trial last evening, and worked beautifully. The rotunda has two lights, placed above the balcony rail on the north and south sides; there are seven in the train shed and two more in front of the station. The illuminating power of these was a pleasant surprise. Railroad square was lighted brightly; the long train shed was so well illuminated that persons could be distinguished throughout its great length, and the beauties of the rotunda were never better brought out by sunlight. The lamps in the rotunda are so situated that the long corridors on either side were also brightly lighted. The test of the light was ended at 8 o'clock, and it will be put permanently in use as soon as possible. The shops of the Concord Railroad are to have ten of the arc lights. The plant is put in by the Forsaith Electrical Company, of Manchester, and power is furnished by a thirty horse-power Putnam engine.—*Concord Monitor.*

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JAN. 19, 1886.

334,450 Manufacture of electrical conductors; Howell R. Mason, Chelsea, Mass., assignor to the American Bell Telephone Co., Boston, Mass.

334,517 Electric clock movement; Silas C. Dickinson, Wilton, Iowa.

334,606 Circuit for electric railways, Frank L. Pope, Elizabeth, N. J.

334,708 Underground electrical cable; John Kruesi, Brooklyn, and John Langton, Jr., New York, N. Y.

334,709 Machine for making electrical cables; John Kruesi, Brooklyn, and John Langton, Jr., New York, N. Y.

334,712 Regulator for dynamo-electric machines; R. H. Mather, Windsor, assignor to the Mather Electric Co., Manchester, Conn.

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Brooklyn Eagle,
Opperman & Muller, Turtle Bay Brewery,
Equitable Building,
New York Ferry Co.,
Tribune Building,
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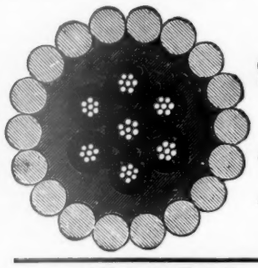

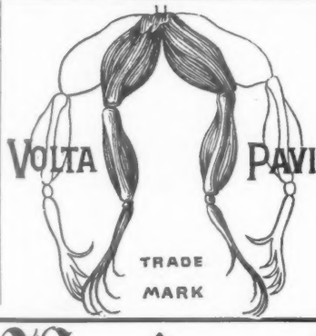

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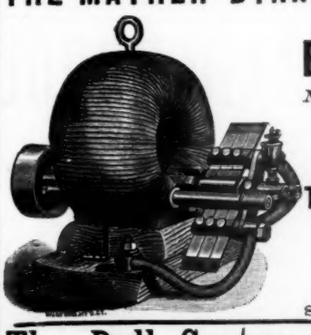

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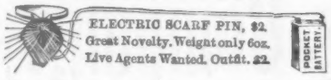

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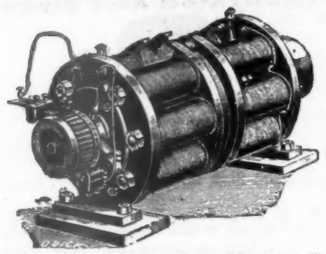

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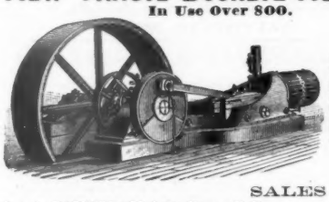

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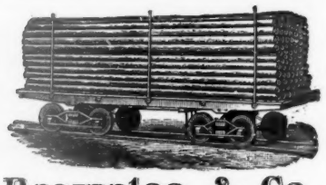

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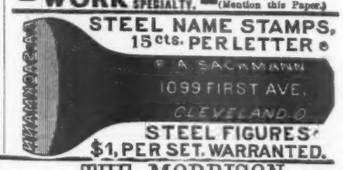

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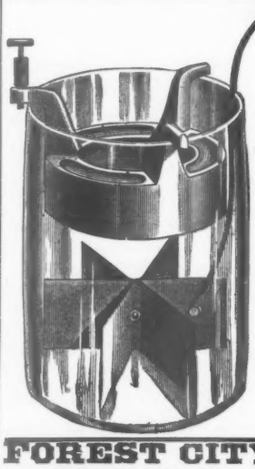

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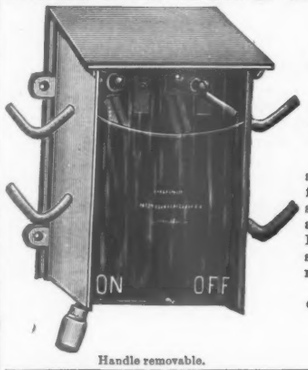

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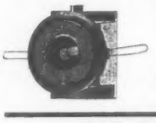

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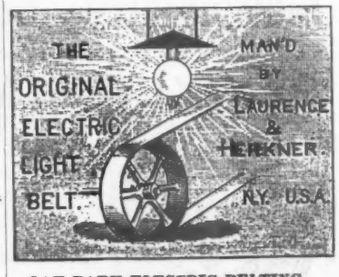

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